The Builder.

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Tiryns.

OF all the series of remarkable excavations carried out by Dr. Schliemann, and of remarkable volumes in which these researches are recorded, none has such direct and genuine interest for the architect as the just-issued volume on Tiryns.* There is not, of course, the same glamour of association with the name which there is about the subject of Troy; nor, let it be admitted, is there anything in the discoveries so far which can compare in artistic value with the gold work of Hissarlik and Mycenæ. The ornamental work discovered is so far confined to pottery and bits of wall-painting of archaic design and workmanship. The remarkable point in the work is the full and intelligible nature of the architectural remains which have been unearthed, to which additional value is given by the learned critique, sometimes a little imaginative but always suggestive, of Dr. Dörpfeld. For generations the "Cyclopean Gallery at Tiryns" has figured in all kinds of books on architecture, popular or scientific, as one of the most remarkable and mysterious of ancient remains; yet the world has been content to look at this remnant and shake its head mysteriously about it, without taking any trouble to find out its meaning, or to look for any further relics which might throw light upon it. In March of 1884, Dr. Schliemann comes on the scene with his apparatus of 20 crow-bars, one large and two small windlasses, 50 large iron shovels, 50 pickaxes, 25 hoes of a kind known in the East as *Tschapa*, and "40 English wheelbarrows with iron wheels" (which last item we note as our only national connexion with the matter, so we may as well make the most of it), and, under the attacks of these weapons, the mystery of Tiryns disappears, and its plan is laid bare, measured, drawn, and published. Something, of course, of the poetic interest of the place dissolves under this acid of investigation and criticism. *Omne ignotum pro magnifico;* and the gallery of Tiryns, with its mysterious epithet "Cyclopean" (which acts on the pious imagination like "that blessed word Mesopotamia"), seems brought from the mythical past into the light of common day. There is, of course, much room for conjecture and for further investigation; but, on the whole, the wonder is that there should still be so much of the plan of the citadel left, so clearly defined, after so many ages.

Dr. Schliemann's sketch of his mode of life while carrying out the excavations is as interesting and as graphic as usual, but we must pass over that to treat of the main subject-matter. He had, as some of our readers are aware, made some initial excavations at Tiryns in 1876, working there for a week with fifty-one men, but it was not till 1884 that he had time to get to work there again. Dr. Dörpfeld, of whose contribution to the volume we will speak later on, accompanied and resided with him there. The first work was to dig away the rubbish down to the floor of lime and small stones which spreads over the whole surface of the Acropolis, and which was covered, from 1 to 1½ mètre deep,* with fragments of brick, masonry nearly calcined, and black earth.

"It then appeared that the walls found in my excavations of 1876, consisting of large stones without mortar, were only the foundation-structure of an immense palace, occupying the whole of the upper citadel. Of its walls, the lower portion, built of smaller stones and clay about 0·50 mètre high, had been remarkably preserved by the close covering of *débris* over all the building, which came down from the higher walls of the edifice, made of unburnt bricks, and from the flat roofs which consisted probably of clay. This preservation is also due to the conflagration by which the palace was destroyed, for its heat was such, whenever beams of timber fed the flames, that the stones were calcined, the binding clay burned into real brick, and the whole reduced to so hard a mass, that our strongest men had the greatest difficulty in breaking it with pickaxes. Many of these works thus burnt were visible on the surface, and had misled the best archæologists, as they were assumed to be Mediæval, and it had never been imagined that they could be perhaps 2,000 years older, and belong to the palace of the mythical kings of Tiryns. In all guide-books for Greece, therefore, the opinion is expressed that nothing of interest is to be found in Tiryns."

As at Hissarlik, Dr. Schliemann considers that he finds at Tiryns traces of more than one age of inhabitation, without counting the Byzantine and other walls obviously more modern than the bulk of the structure. Traces, in the shape of clay floors, appeared here and there in the outskirts of the citadel, of a still older and primitive habitation; but this successive possession of the site by different people seems established by the entirely different types of pottery found. To these two types of pottery found, two separate chapters are devoted, and largely illustrated. The earlier forms Dr. Schliemann conjectures to have belonged to the aboriginal inhabitants of Tiryns, the latter to the builders of the citadel, a portion of "that great Asiatic people which, about the middle of the second millennium before Christ, covered the whole of the mainland of Greece, as well as the islands of the Ionian and Ægean seas, with and which had already attained a high level of culture." Into this race question we do not enter here; but every one who examines the illustrations will perceive that the examples of pottery belong to two different peoples.

We turn now, however, to what constitutes the real architectural interest of the volume, the plan of the citadel and its chambers as laid bare by Dr. Schliemann. We cannot, of course, reproduce here the plan; to do that would be to deprive of its principal value a book which every archæologist will desire to possess; but we can briefly follow Dr. Dörpfeld through his interesting disquisition on the buildings. The plan shows a long irregular enclosure running nearly north and south, within immensely thick walls, and divisible into a lower, middle, and upper portion, of which the upper portion contains an elaborate array of courts and chambers forming the residence. This latter portion is on the highest ground of the eminence, which slopes away rapidly on all sides, the thick outer walls being almost entirely built on a steep slope. These walls have one principal entrance on the east side, being otherwise entirely unbroken except by two narrow posterns, one at the northern extremity, the other in a semicircular tower projected from the walls on the west side, and as thick as the main walls themselves. The first thing that occurs to one on looking at the whole disposition of the plan is its remarkable similarity in general idea to the disposition of a Mediæval French château. In both we have the thick walls and towers descending to the lower ground, and the habitable portion securely placed within the least accessible portion of the enclosure on the higher ground. The lower citadel is still unexcavated, though shafts sunk here and there have shown that here also are the walls of buildings preserved beneath the accumulation of soil and *débris*. The walls remaining in the small intermediate portion which has been called the middle citadel were of inferior construction, and in bad state of preservation. But in the upper citadel remains the plan, nearly complete in essentials, of what may be called a palace of the Homeric age.

In regard to the outer walls Dr. Dörpfeld notes that the statement of Pausanias, that a yoke of mules could not move the smallest stone at Tiryns, is an exaggeration, as many of the stones can be easily moved by a single man; but on an average the blocks are of great dimensions, stones of from 2 to 3 mètres long, 1 mètre in height, and 1 mètre in thickness, being found in great numbers. Concern-

* The Prehistoric Palace of the Kings of Tiryns: the Results of the Latest Excavations. By Dr. Henry Schliemann. The preface by F. Adler, with contributions by Dr. W. Dörpfeld. London: John Murray. 1886.

* The measurements throughout the English edition are given in mètres.

ing these great blocks there are some remarks worth noting in Professor Adler's preface. He comments on the tale which they tell of the settled power of the ruler under whose reign they were built together. The citadel could not have been built in a hurry, in the sight of the enemy, or as the first stronghold of an invasion based on maritime supremacy; "the colossal walls tell every one able to read the language of stones, that their erection can only have been effected in a long period of peace, by a ruler with unusual resources of power, and who had trained workmen under his permanent control." In regard to the practical value of this employment of immense stones Professor Adler has a new suggestion to make. He conjectures that in the building up of these walls a strong mortar of loam or potter's clay was used as bedding material, which facilitated the laying, joining, and further piling of the stones, but which dried up afterwards and was gradually washed away. This would leave many interstices for footholes in the walls, and hence the desire to choose such large blocks for the lower and middle courses as should render the scaling of the walls by this means impossible. The largest blocks being only found in the lower and middle courses on the outside is a fact which certainly favours this hypothesis, in which we gather that Dr. Schliemann and Dr. Dörpfeld concur. Two other special points may be noted in regard to the outer walls. One is, that there occur in them several straight joints from top to bottom of the work, at tolerably even distances, leading to the conclusion either that towers were first built and afterwards connected by walls, or that the first outer fortification was of a slighter and more temporary nature, and the massive wall of masonry was subsequently built up in sections, as the materials could be got together, and as time and opportunity allowed. Another peculiarity is the existence, in the inner face of a portion of the eastern wall, of half a dozen large niches, the most southern of which can be accurately measured (3·20 m. wide by 3·70 m. deep); the rest are still filled with *débris*. Dr. Dörpfeld says that apparently these niches were finished in the form of a pointed arch, made by over-sailing stones as in the famous gallery, and that further south exists a niche (shown on the plan), which still retains its "ogival"* vault. Without a knowledge, which we can never now possess, of the internal economy of the fortress and the ways of its inhabitants, it seems useless to make any suggestion as to the object of these large niches; but Dr. Dörpfeld, like a true German, must have his explanation of everything (*quot Alemanni, tot sententiæ*, as Mr. A. Lang recently said of German archæologists), and he considers they were intended to economise material in building the wall, the object being to have as wide a platform at the top as possible. "Many nations have in later times built their fortress walls in a similar way; on the inner side the walls were strengthened by projecting buttresses, united by vaulted arches, and thus a wide surface above was obtained." As this construction only obtains for about one-twentieth part of the whole linear measurement of the walls, such an explanation is almost absurd; a construction deliberately adopted for such a reason would have been carried out consistently. The convenient piling of arms seems to us the most probable reason for these niches; certainly more probable than that which we have just quoted.

In regard to the meaning and use of the well-known gallery, the later excavations in 1885 brought to light a new and interesting fact, not at all suspected when Dr. Dörpfeld wrote his first series of remarks on the excavations, from which we have been quoting. He had formed the idea from a suggestion of Captain Steffen's, and expressed it pretty positively, that this gallery with its range of arches was a series of sally-ports, opening on to the platform of the lower portion of the outer wall, whence the defenders could emerge on to this said platform in case the assailants had attained to it. This platform seems to have been a pure assumption, but, as the foundations of a great thickness of wall remain outside the line of the gallery, it was assumed that the wall was built in a kind of "two-decker" arrangement, the lower platform running beneath the line of arches of the gallery on the upper wall. The well-known gallery is near the south-eastern angle, but on the south face there has been discovered a similar gallery with rows of pointed *quasi*-arches. On clearing away the obstructions from these the excavators expected, according to their theory, to see the platform of "the lower wall" extended before them, instead of which they found each arch led into a pointed vaulted chamber, constructed in the same way, and with no communication, not so much as an arrow-slit, with the outer face of the fortifications. Thus "all that we had said on page 184 and following pages was proved to be untenable," a caution that should be remembered by theorisers. There was no "upper and lower" wall at all; the whole thickness of the wall was carried up and honeycombed with what were obviously storage cellars, with a long passage, out of which they opened. The "Cyclopean gallery of Tiryns" is another of these passages, from which the masonry of the cellars on which it once opened has been removed in the course of ages.

To come, however, from the walls to the habitation,—for we have waited outside long enough. Entering the outer wall by the one main entrance on the eastern side, turning sharp round to the left, and going about twenty yards southwards between two high and thick walls, we reach a great gate, "which in dimensions and construction corresponds closely with the Lion Gate at Mycenæ." This is the doorway to the precinct of the habitation, leading into a long irregular courtyard stretching southwards, and at its southern end, turning to the right, we pass through a portico *in antis*, with two columns between *antæ*, into a second courtyard, and turning to the right again, and having now turned quite round and facing northwards, we see in the north-west corner of this courtyard (which is also very irregular in shape), another portico *in antis* leading northward into a nearly square court, with a colonnade round three sides, and on its northern side, centrally situated, again a portico *in antis* leading through a vestibule and inner vestibule to the large *cella* forming the principal chamber of the house, with a circular hearth in the middle of it. This Dr. Dörpfeld calls, and we think with probability amounting to certainty, the principal men's apartment; the principal women's apartment is not far from it, but reached by a circuitous route and its own open forecourt, but only a single vestibule. Around them is a labyrinth of smaller rooms and passages, the special use of which, except in one case to be mentioned just now, can only be mere conjecture. But the main features as we have mentioned them seem as clear on the published plan as anything can be.

The actual remains from which this plan is constructed are, of course, themselves more like a plan than a building; but there seems to be quite sufficient to reconstruct the main scheme of the building from. There are walls standing one mètre, more or less, above the floor-line, and bases of pillars *in situ*; besides a number of interesting and suggestive details of various kinds, some of which we may briefly touch upon.

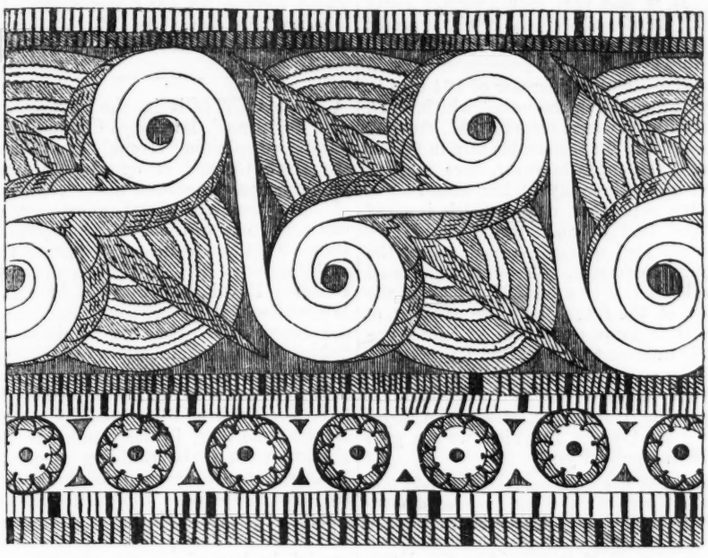
The entrance, before spoken of as analogous to the Mycenæ gate, shows an immense threshhold, 1·40 mètre wide and more than 3 mètres long, flanked by two door-posts of breccia, 3·20 mètres in height: one still in its place, the other with the upper half broken off; these are rebated for the door-casing. On each side in the threshold are the pivot-holes on which the doors turned, and halfway up the door-posts are seen the cylindrical holes for the bolt or bar. The inner gate building of the house, the portico *in antis*, shows the bases of all the columns, and those of three of the antæ, *in situ*. The door-sill is a limestone block, 4 mètres long and two broad, with circular pivot-holes, ·21 mètres, or nearly 8 in. in diameter, showing the weight and size of the folding-doors which turned in these pivot-holes. The section of the pivot-holes is hemispherical, and the door turned on sockets shod with bronze. For in the sill of the entrance to the "women's apartment" was found a bronze socket still in its pivot-hole, a cylinder with a cut in the side of it for the bottom rail of the door, and finishing below in a convex hemisphere working in the concave pivot-hole. The position of the pivot, with the square slot in it turned diagonally, showed that the door was half open when the fire destroyed it. This is truly a remarkable instance of what may be found in remains of buildings of pre-historic date, if it is only looked for. Any one who had been commissioned to excavate on the site of Tiryns to discover how doors were hung some eight or nine centuries before the Christian era would probably have laughed the proposal to scorn; yet here was the door-pivot nevertheless.

The forecourt of the men's apartment, which is about 15·75 mètres deep by 20·25 wide, is floored with a concrete in three layers, the lowest a coarse *béton*, as a foundation. The upper surface has a fall for carrying off the water towards a point on the south side, where there is a vertical shaft covered with a flag. We almost expect next to hear that there was a bronze bell-trap found in it, but that does not seem to have been forthcoming. In regard to the court and its position relative to the main apartment, Dr. Dörpfeld refers to the description of Vitruvius of a Greek dwelling-house, in which the court had colonnades on three sides,—west, south, and east,—and on the north a vestibule, to which the main rooms adjoined. He might have been describing the plan of this portion of the Tiryns remains, which coincides even to the points of the compass, and, as Dr. Dörpfeld remarks, indicates that the later Greek house was developed from that of the Homeric age.

The vestibule to the men's apartment is, as we said, a portico *in antis*, the bases of the pillars and *antæ* are *in situ*. The former are irregular blocks of stone, with a circular base worked out of them on the upper face. The irregular portion, we should imagine, was probably concealed by the floor originally. Four similar bases are found around the circular hearth in the centre of the men's apartment, and on their surface is an inner circular mark, within which the stone is well preserved, while the surrounding edge was eaten by fire, and partly chipped away. We have here proof that the columns themselves were wood, and circular, and smaller than the stone bases. In regard to the columns and *antæ* of the vestibule, it is remarkable that the centre line of the columns is set considerably back from the centre line of the *antæ*, so that any epistylium resting on the latter must have been appreciably in rear of the front face of the antæ. Dr. Dörpfeld offers several conjectures as to the actual arrangement. We are disposed to think that the antæ were not treated as pilasters in the usual sense of the word, but were large flanking masses of masonry, which, on their upper portion, formed a "stop" to the wooden construction of the pillars and entablature. If, as is probable, the roof-beams ran at right angles to the front, they would probably rest on the epistylium, and project forward, forming a projecting eave, with the beams in a line with the outer face of the *antæ*.

It is remarkable that the circular hearth in the middle of the men's apartment corresponds with a similar feature in the middle of one of the large rooms at Hissarlik, which is, therefore, now conjectured to have been an apartment forming a similar portion of the Trojan palace. In regard to the apartment at Tiryns there appear to remain plain indications of floor decoration. This consisted of cross series of lines scratched on the surface of the upper and finer layer of concrete which formed the finish; and Dr. Dörpfeld affirms that there are distinct traces of red in the squares left between the lines, and of blue in the lines. It thus formed, as he says, a "simple carpet-pattern." A point of more special

* This essentially Continental word for a pointed arch section should hardly have appeared in an English translation. English architects and writers have never adopted it.



Wall Painting in the Palace of Tiryns.

interest in connexion with this apartment is the construction of the central portion over the four columns which form the four angles of a square around the central circular hearth. Dr. Dörpfeld suggests that these supported a raised central roof, rising above the rest of the roof and giving side "clearstory" lights. Mr. Fergusson dissents from this view, in some remarks printed as a footnote, as he thinks the large scale of the apartment would have rendered the construction, at that period, too difficult. We are disposed to think so too; but these four columns supported something, the question is what? Mr. Fergusson prefers the theory that the men's apartment rose higher than the surrounding buildings, and had upper lights at the sides. Light from the door, through the two vestibules, one within another, is out of the question; and a hypæthral opening over the fireplace seems exceedingly improbable, as it must have destroyed all the comfort of the apartment in some states of the weather.

We alluded before to one other apartment of which the use seemed pretty obvious; this is what has been assumed to be the bath-room. This is a small room about 3 mètres by 4 in size, placed a little out of the way to the north-east of the forecourt of the men's apartments, and in such a position that a visitor could readily be conducted to it on his way to the main apartments. It is floored with a single block of limestone averaging nearly 2 ft. in thickness, the under side rough, the upper surface levelled and polished. At the north-east corner is a square gutter cut out in the stone, and leading into a stone pipe carried through the wall. The theory is that the bath-tub was placed on the floor, and after use simply emptied on to the floor, and the water allowed to drain away. By a fortunate chance, adds Dr. Dörpfeld, we found a fragment of such a tub, which teaches us that it was made of thick terra-cotta, and that its form nearly resembled a modern bath. This is proving a little too much. The fragment found is given in one of the illustration plates, and the assumed outlines of the remainder shown in dotted lines; but the fragment is too small to afford this evidence in so absolute a manner as is assumed. Around the margin of the stone floor are a number of dowel holes, in couples, at regular intervals, and these we are told were "evidently to secure to the floor a wooden wainscotting." Why so? That would not be the most likely kind of material to choose specially to line a bath-room with. The reason for supposing it to have been wood is that the adjoining stones show marks of the effect of fire. What is still more questionable is the assumption that if the dowel-holes had been carried completely round all the four walls, then we might have assumed that this apartment was a reservoir for water! This is about the oddest notion of constructing a reservoir for water that was probably ever suggested, and shows that Dr. Dörpfeld's conclusions are not always based on practical knowledge. As a matter of fact, the dowel-holes are interrupted at a point where a door from the next apartment would naturally have been placed. But all this proves nothing as to its being a bath-room. The solid stone floor and the gutter point strongly to that conclusion; the idea of a wooden wainscot is rather against it than otherwise, and, as we are inclined to believe that it really was the bath-room, we are for that very reason disposed to doubt if the meaning of the dowel-holes has been correctly expounded.

Among the architectural remains illustrated is one Doric capital, found piecemeal but in sufficient preservation to put it together, and which is analogous in character to the Sicilian Early Doric work. No trace of a shaft belonging to this column has been found, nor of any other capitals of the same class; possibly more may be found if the excavations are continued. This capital does not belong to the date of the main buildings of the palace which has been excavated. In all probability it was part of some small temple subsequently erected in or near the precinct, after the stone Doric style had penetrated into Greece; and being of less "Cyclopean" build than the walls of the more ancient palace, its fragments were more readily looted after the general ruin. It is curious to find what is generally regarded as archaic Doric thus appearing as the modern work, so to speak, of the site.

As an appendix to the book are a number of admirably-executed plates, many of them in chromo-lithography, of various details of wall-painting and pottery which have been discovered. One of the most curious and interesting of these represents a man performing apparently a kind of acrobatic dance on the back of a galloping bull; both man and animal are ill-drawn and archaic in outline, but not without a considerable amount of spirit in the representation. Of the decorative details we give a reproduction in black and white of one, a band of mural ornament, of which there are sufficient fragments for a complete restoration. The colours are red, blue, buff, the parts left white in our sketch being shown with a faint tinge of cream colour. The black portions are black in the original. In the main band of the design is seen that continuous spiral which is to be found, in one form or another, over so large an area of pre-historic Europe.

We must close our brief sketch of this remarkable publication, in which we can assure the reader that we have merely given an inadequate summary of the interesting matter, both in text and illustration, with which it abounds. It is a book that every archæologist and architect who takes serious interest in architectural history should possess, and which combines learning and research and shrewd suggestion with all the interest of a romance. Our notice would be incomplete if we omitted to mention that the book is dedicated by Dr. Schliemann to Mr. James Fergusson, "in grateful acknowledgment of his interest in my labours and the help derived from his scholarship and profound archæological learning since the commencement of the discoveries at Troy."

NOTES.

A RECENT report from the United States shows that the great wave of depression which has been so marked (and, indeed, still is) in this country, has not been without its corresponding effect on the other side of the Atlantic, although there is always this difference between the two, viz., that a certain amount of new building is rendered necessary, however bad the times may be. We see the result of this in the fact that, whereas in the old-established cities there has been more or less stagnation, with a few exceptions, in the newer ones, further west business has been much more brisk. A marked and an unwished for feature in the situation is that there is a notable increase in wooden and nondescript structures of a low cost. The stranger landing at New York would, however, be struck with the large amount now being expended either in huge business premises or residential apartments; and, indeed, if the same activity existed in other places builders would have no reason to grumble. The figures for the last three years and a half are as follow:—

	Number.		Cost.
1882	2,577	.....	$44,793,000
1883	2,623	.....	44,3[illegible]4,638
1884	2,897	.....	41,461,208
1885	1,698	(for first six months)	25,783,705

The expenditure of over 50,000,000 dols. (supposing that the rate keeps up to the end of the year) shows that the American capital has no intention at present of checking its upward growth. Philadelphia has also increased its assessment of real estate from 562,687,555 dols. in 1883, to 587,749,828 dols. in 1885, although new buildings will not account for all this, which includes works of transportation, water, gas, and sewerage. The total increase of buildings in the three years and a half is 18,173 which is far in excess of any other city in America, although for the present year the construction of new buildings has been the largest at San Francisco. Both St. Paul and Minneapolis are in a most flourishing state as regards the building trades, and there can be little doubt that ere many years are past these two north-western cities will join forces, and in time perhaps rival Chicago in size. The estimate of the new buildings in these two places will quite warrant such a prophecy:—

	1882.	1883.	1884.	1885 *	Total.†
St. Paul.....	2,511 ...	3,480 ...	2,383 ...	1,635 ...	10,009
Minneapolis ...	2,155 ...	3,420 ...	2,341 ...	1,670 ...	9,586

* Six months. † Four years.

Nearly 20,000 new buildings, within four years, in cities not half a dozen miles apart from each other, give a fair idea of the rapidity of American settlement. The following list comprises the number of new erections and their cost through the United States for the last three years and a half:—

	New buildings.		Cost.
1882	20,261	.....	$97,835,000
1883	24,998	.....	102,450,000
1884	28,020	.....	102,868,000
1885 (six months)	14,919	.....	42,279,000
Total.....	88,196	.....	$345,432,000

(exclusive of Philadelphia). It must be owned that the expenditure of 69,086,570*l.* in three years and a half speaks volumes for the general extension of the country and of the building trades in particular.

MR. FERGUSSON'S article on Westminster Hall, in the current number of the *Nineteenth Century*, should be read by all who are interested in the subject. Those who are against the absurd treatment proposed by the late Government will find their opinions

supported in Mr. Fergusson's paper; those who are in favour of the said scheme may possibly learn something from Mr. Fergusson, if they are not too bigoted to learn. Mr. Fergusson takes the view that we have expressed all along, that the scheme proposed by Mr. Pearson, or by some one else who instigated him, was mainly founded on superstitious reverence for a portion of Norman walling, of no special interest beyond the fact of its being Norman. We are surprised, however, that Mr. Fergusson does not say anything about the most crying practical sin of all in the scheme, the proposal to break up the area of Westminster Hall by projecting two staircases 15 ft. into it, as a means of communication with the small and ill-lighted rooms which it is proposed to make into committee-rooms. It is very difficult to get the public to understand a matter of this kind on paper, but we predict that if this foolish scheme of false archæology is proceeded with there will be a public outcry when people discover what is actually proposed, and find that the area of the Hall is to be permanently destroyed to furnish steps to get to rooms which will be ill-placed and utterly inadequate for their purpose.

IT appears from a list recently issued by the Railway and Canal Traders' Association that about one hundred of the candidates for Parliamentary honours are chairmen or directors of railway companies. These figures are exclusive of Ireland, and the statement is possibly otherwise incomplete, as the present Parliament includes among its members about one hundred and thirty railway officials. The Association is following up the circular issued a month or so back by another address to traders, giving the particulars just referred to, and accompanied by a reprint of a very forcible article on the subject of preferential rates which appeared in the *Sheffield Daily Telegraph* of September 26th last. A list of questions for ascertaining the views and intentions of the candidates with regard to this and kindred matters is given, among which appears the following:—"Whether, in view of the fact that such a rate would prove fairly remunerative to the railway companies, they will assist the promotion of any legislation having for its object the institution of a rate per truck per mile,—which would give traders the alternative of sending, at their own risk, any kind of goods without reference to class, and immensely simplify the question of carriage." This appears to be a novel idea, and we shall be curious to know how the companies regard it. The carrying capacity of a truck varies so much that the advantage of such a system would often be doubtful, while the fixing of the rate would be a matter of great difficulty, and would, in all probability, frequently fail to give satisfaction to all. At the same time there is, doubtless, much that is practical in the suggestion, or it would not be made by such an eminently practical association. We observe that candidates of entirely different shades of politics have already announced their intention of taking up arms on behalf of the trading interest, and it is probable that when the battle of rates is resumed in the House the railway companies will have to act on the defensive.

THE use of liquid fuel for steamers, of the preparation for which change we gave some particulars on the 12th of January, 1884, has now made such advance that an Association has been formed, under the title of the Hydro-Carbon Syndicate, in order to supply apparatus devised to utilise all kinds of crude petroleum, shale oils, residuum from oil refineries, and the like. The advantages claimed are, first that, weight for weight, the liquid fuel will do twice or two and a half times the work of coal. Secondly, that there is a great saving of time and expense in taking the fuel on board, as well as an absence of smoke from the combustion. Thirdly, the oil may be carried in the water-ballast tanks, which are to be filled with water when the oil is pumped out, and the storage capacity of vessels may be thus increased. Some particulars are given of a recent voyage of the *Himalaya* from Barrow-in-Furness to the Black Sea and back, in which 447 tons of coal were burned, at a cost of 456*l*. It is said that such a voyage could be done by the use of 180 tons of oil, at a cost of 270*l*. This saving in fuel is thus estimated at 186*l*., to which is added a saving of 222*l*. in firemen's wages, and an increase of 164 tons in the carrying capacity of the vessel, which, at 1*l*. per ton each way, would come to 328*l*., showing a balance of 550*l*. for the double trip in favour of the oil. The price, however, here allowed for the oil is considerably higher than that of the Russian petroleum refuse, which is cited as one-third that of coal; which would give an additional 118*l*. as against coal, taking the other figures as correct. Certainly liquid fuel has to be looked at as a probable factor in the navigation of the future, and the prospect of obtaining it in large quantities at Sibi is one of no little interest to the United Kingdom.

WE have received the following circular from the Hon. Secretaries of the Royal Meteorological Society, to which we are glad to give further publicity:—

"A committee has been appointed to take into consideration the question of the supposed diminution of water supply and the suggested increase of floods. The committee is desirous of obtaining as much information as possible, and will, therefore, be very glad to receive any data that you may have bearing upon the subject, and showing the past and present state of the water supply, either from gaugings of wells or springs; the height of flood-marks in rivers, streams, and lakes; the records of low-water periods; or any historic data which you may have collected relating to the subject. Information relating to the period between 1825 and 1835 would be extremely valuable, in order to enable the committee to fill up a gap in the diagram accompanying the report in the *Quarterly Journal* for July, 1885."

Communications on the subject should be addressed to the Assistant Secretary, Mr. W. Marriott, at 30, Great George-street, Westminster.

THE Hounslow Local Board, at its meeting on Tuesday night last, resolved to apply to the Local Government Board for sanction to raise a loan of 77,000*l*. for carrying out a new drainage scheme for the combined districts of Hounslow, Heston, and Isleworth. The scheme which has been adopted was designed by Mr. Bromley, the Surveyor to the Board, and has received the approval of one or two well-known engineers to whom it was submitted. Notice has also been given to the Local Government Board of the Local Board's intention to acquire a piece of land in the district as a site for the precipitation works. The consideration of the question as to whether a dust and sludge destructor, by which the refuse from the dust-bins and the sludge are burned together, or sludge-presses, should be adopted, has been delayed pending a thorough inspection of both systems. The Brentford authorities are at present constructing sludge-presses similar to those at Chiswick. The Richmond and Kingston authorities have had under their consideration separate schemes for the drainage of their respective districts since the dissolution of the Thames Valley Sewage Board, but have been unable to come to a definite decision over rival schemes. The scheme now adopted by the Hounslow Board is that which the Surveyor (Mr. Bromley) prepared for the inspection of the Committee of the House of Commons, for the purpose of showing that the district could be drained more efficiently and economically in a separate scheme than by the proposed combined scheme of the now defunct Thames Valley Sewerage Board.

THE total gross fees received by District Surveyors for the year 1884 was 46,792*l*. 11s. 6d. in respect of 26,363 works, of which more than three-fourths were completed within the year. The gross fees received in thirty-nine districts varied from 22*l*. to 592*l*. In two of these the receipts did not amount to 100*l*.; in four districts the receipts were less than 300*l*. each; in nine less than 400*l*. each; in eleven less than 500*l*.; and in thirteen less than 600*l*. each. In thirty-one districts, the receipts ranged from 608*l*. to 2,237*l*. The largest amount of fees received was by the District Surveyor of Camberwell, Mr. Jarvis, whose income for 1884 was 2,237*l*. 1s., and next to him comes the District Surveyor of Fulham, with an income of 2,043*l*. 11s. 6d.

A COMPETITOR in the recent Liverpool Labourers' Dwellings Competition sends a letter complaining strongly of the action of the Town Council in refusing to award the premiums on the ground that, "although some of the plans submitted show considerable merit, not one of them is in complete accordance with the conditions requiring that the buildings must in all respects comply with the Building Regulations in force in this City." We confess this appears to us hard measure on the competitors who are admitted to have "shown considerable merit," considering the amount of work they must have thrown away; and we think a more liberal view might well have been taken by a wealthy corporation. At the same time, if the conditions set forth absolutely that the Building Regulations of Liverpool were to be complied with, we cannot see that competitors who overlooked this condition have any technical ground for complaint. Our correspondent points out that there is a special by-law giving the Council power to make exception to the Act as regards Labourers' Dwellings. But if this power of exceptional dealing was not contemplated or included in the instructions to architects (and we presume it was not), the competitors cannot claim that in their favour.

THE recently-reported case of Street *v.* The Union Bank of England and Spain is of interest to men of business at the present time when so many firms are adopting registered telegraphic addresses. The bank in question adopted the registered address of "Street, London," and Messrs. Street & Co., 30, Cornhill, London, moved for an injunction to prevent the bank from using this address, to prevent the inconvenience which was caused to them by it. But Mr. Justice Pearson held that however inconvenient the address of the bank might be, he could not interfere when there was no attempt to injure trade, and no legal injury done. It is probable that this will not be the only clashing of a registered address with an existing name, and it would probably be convenient to all parties if the Post Office were to make a rule by which a registered address should be altered if it was so similar to an existing and previous name as to be a cause of real inconvenience.

IN regard to a recent burglary with violence, a correspondent writes to suggest that country houses should have their approaches and drives well lighted at night. At present the large house of the district is often the only one to which it is possible for people with felonious intentions to approach after nightfall under cover of absolute darkness, even at an early hour in the evening. "In the village the public-house and small shops are alight, and people moving about, up till ten or eleven at night. The mansion only is dark and silent." The dinner guest has often to find his way up a dark avenue or drive. When he and the other guests are occupied about dinner, and the attention of the domestics mostly concentrated on the kitchen department and in attendance, the burglar finds his way up by the same unlighted approach. The suggestion seems worth the attention of dwellers in country mansions.

STEPS are being taken both at Milan and Mantua to erect statues in memory of Garibaldi. In the latter city the movement has proceeded so far that the committee appointed to arrange matters has entrusted the execution of the monument to the well-known sculptor, Bordini, of Verona. At first it was intended to have a colossal design, but it was eventually decided to have a more moderate sized one, of 28 ft. or 29 ft. in length, of which the figure will be a little over 10 ft. Its proposed situation is in front of the Teatro Sociale, between the Piazza S. Sylvestro and the Piazzo Leona.

THE Christmas number of the *Art Journal* which is already out (Christmas numbers will presently be published at Midsummer, we imagine), is a monograph on Sir John Millais and his works, containing some admirable engravings from his leading or best known pictures, and also some facsimiles of sketches and studies, which are of interest. Among the illustrations is a beautiful reproduction of "Chill October."

FROM the *Admiralty and Horse Guards' Gazette* we learn that the Duke of Connaught, in response to an appeal made to him by Captain Armit to assist in providing funds for the purpose of building "human houses" for the poor of Windsor, "now huddled together in slums lying at the very foot of the Royal Castle," has replied through Sir H. Ponsonby that he shall be happy to bring the subject before Her Majesty "when a scheme for improvement has been matured by the authorities of the borough." We hope this reply will tend to stir up "the authorities of the borough" to a sense of their moral obligations in a matter of this kind.

BOURNEMOUTH UNDERCLIFF DRIVE COMPETITION.

THIS is a competition under an engineering project, submitted for decision by the promoters to eminent engineering judgment, and won by engineers. That profession, however, does not seem by any means to have monopolised the contest, though the field was properly theirs, as several of the designs bear marks, we think, rather of architectural than engineering parentage, while some, perhaps, could lay claim to neither.

Two things may be said at the outset,—that it appears to have been a carefully and judiciously prepared and a most fairly conducted competition; and that the designs generally evince careful and conscientious study and preparation. Of course a subject of this kind must of necessity be viewed in very various aspects by men of different professional training and habits of thought, but the simple and practical view seems that which should prevail over all others, and this appears to have ruled Sir Joseph Bazalgette in his examination of the designs, and in his careful report upon them; and the labour is not light of thoroughly comparing twenty-nine separate sets of drawings and weighing the pros and cons of their various points of design and construction. The premiums offered were liberal in amount, viz., 200*l*., 100*l*., and 50*l*., and their award rested entirely with the assessor, who strictly adhered to the terms of the invitation. The whole conduct of this competition seems one which might well serve as an example for other such trials of skill, but which too often, unfortunately, afford a very different spectacle. The designs are arranged for exhibition under numbers, according to the totals of the different estimates, beginning at the lowest, the order being, however, broken for the purpose of placing the three successful plans together. The length of the proposed drive is about 2½ miles.

No. 1, "Steadfast," shows a drive 36 ft. wide and a footway of 13 ft., the height above "O. D." ("Ordnance datum," we presume) not stated. The communication with the beach is by slopes at twenty-two points; the road is of flint metalling and the footway of 2-in. tar paving. The sea-wall is of Portland cement concrete, at a cost per cube yard calculated at 14s. The road surface is put at the very low rate of 1s. per yard superficial, and that of the footway at 1s. 6d. The total estimate (which, however, is noted as not complete) is put at 22,649*l*., viz., 17,649*l*. for the works on the beach, and 5,000*l*. for those of the cliff. The first item appears surely much below any probable achievement, and the second very low, in our opinion, for what *must* be done.

No. 2, "The Current," &c., has the roadway kept down to the level of the sands, constructed of granite at 5s. per yard, the footway of tar paving at 2s.; the sea-wall of concrete at 18s. per cube yard, or 20s. per yard run. The drive to be lighted by seventy gas-standards. The cost is estimated at 27,508*l*., being 25,570*l*. for drive and 1,338*l*. (!) for cliff works; the roadway to be 30 ft. wide and the footway 10 ft. This roadway has a tortuous appearance on plan, following closely the line of the cliffs, and it would, of course, much less interfere with the picturesqueness of the sea front than other more raised roadways; but it would be far more exposed to encroachment by drift sand in storms, and be far more difficult to keep in working order, and much less command the sea view. The sea-wall is again very deficient in foundation depth, and the quantity of concrete per yard lineal should be nearly doubled to ensure an efficient sea front. Surface paving is shown on the top of the cliff, with railing shoots to convey the water to the foot drains under the road. The cliff difficulty in its reality is not here met.

No. 3, "Experto Crede."—A 40-ft. carriageway and 10-ft. footpath, steps, and three slopes to beach; but no access to beach at the ends. The slopes to accommodate bathing-machines. Tarred macadam roadway at 1s. 9d. per square yard; tar-paved footway at 10½d. per yard; Portland cement concrete sea-wall at 12s. per cubic yard. Lighted by 120 gas-standards. The passage under pier would involve bridging one span of the latter by bow-string girders, which would add 1,500*l*. to the estimate of 28,070*l*. 5s. 1d., made up to 26,070*l*. 5s. 1d. for drive, and 2,000*l*. for cliff works. The sea-wall is more substantial than in the two previous designs; but the proposed outlay for cliff works far too low if to be efficient.

No. 4, "Practicus."—An elaborately worked-out design, giving evidence of much care in its preparation. This is, in fact, the sixth design in range of cost; but Nos. 4 and 5 in that range are the second and third premiated designs, and stand eighth and ninth on the walls. This design shows a 32-ft. roadway and 6 ft. 6 in. footpath, the latter certainly too narrow. The road is raised 11 ft. above Ordnance datum, both tracks being of tarred macadam, the carriageway at 2s., and the footway at 2s. 6d. per yard super. Concrete sea-wall at 10s. per cubic yard, and 20s. per yard lineal. The estimate is 26,975*l*. for the drive, and 2,184*l*. for cliff works,—total, 29,159*l*. The sea-wall is designed, certainly, too light, and is founded on the surface of the substratum of clay instead of being sunk several feet into it, *the only safe plan*. The approaches to the drive, on each side of the pier approaches, are well designed. The cliff sections indicate an intention of cutting off several feet of the cliff front to *supposed* more solid matter behind, and a retaining-wall at the cliff-foot is worked hollow so as to form a continuous oval drain, with catch-pits at intervals. Here, again, the real cliff difficulty, of which we shall speak presently, does not seem to be understood or grappled with.

No. 5, "1885."—A 30-ft. drive and 16-ft. foot-wall raised 8 ft. above O. D., with steps to beach at fourteen points, and five inclines for bathing-machines. Tarred macadam is proposed for both tracks, at a uniform cost of 3s. 6d. per yard. Concrete sea-wall, at 8s. per cubic yard. Has no access to beach at the ends; is lighted by sixty-five gas-standards. Estimate, 28,812*l*. 17s. for drive, 2,000*l*. for cliffs; total, 30,812*l*. 17s.; fourteen sheltered seats provided. The drive is near the level of the sands, and thus incurs the disadvantages referred to with respect to No. 2. A belt of plantation is proposed between the cliff foot and the drive, with storage space for bathing-machines behind it in the recesses formed by the hollows in the line of cliff. This would advance the sea-wall in these places 125 ft. or 130 ft. on the beach, quite taking away the sands at high-water of spring tides. The seat-shelters are designed in the not very desirable style of the pier approaches, which, however, may be supposed to indicate the local taste (!).

No. 6, "Relevant."—A carefully-prepared design, showing a 36-ft. roadway and 14-ft. foot-walk, raised 10 ft. above O.D. Drive surface, tarred macadam; footway, tar paving. Concrete sea-wall. Details of estimate not given. There is no access to the beach at the ends of drive,—a serious omission surely here and elsewhere. Estimated cost, 27,377*l*. for drive, 3,779*l*. for cliffs; total, 31,156*l*. A very good line is kept in the sweep of this drive, a point not enough regarded in several designs, and needing good study to secure. The sea-wall shows a massive section, but is founded *on*, not deep *in*, the clay substratum. Of course a great additional cost is involved in this addition to the quantity of walling, but all experience (and at Bournemouth it is not many miles to seek) proves its necessity, and no design or estimate based on less secure arrangements could be safe to work upon.

No. 7, "Utile Dulce."—The first premiated design; it stands No. 13 in order of cost, but with the other prize winners makes a group out of the ordinary course of numbering. This design is not nearly so ambitious in appearance as several others, but, we think, justifies, on examination, the precedence given it, as it is eminently practical and well thought out. Sir Joseph Bazalgette's report on it is its proper introduction here, and some extracts from its designer's description may aptly follow. Sir J. Bazalgette says:—

"The design under the title of 'Utile Dulce' provides a carriage-way 30 ft. wide with a 10-ft. foot-way raised 10 ft. above mean sea-level. Flights of steps, extending along an aggregate sea frontage of from 8,000 to 9,000 ft., give access from the footway to the sands. These are broken by twelve inclines for boats and bathing-machines, each 200 ft. wide, viz., seven on the east side of the pier and five on the west side, in addition to one opposite Durley Chine, 120 ft. long. Also by seventeen projections for sheltered seats, each 40 ft. in length. The steps would be largely used as seats by nurses and children in fine weather. This design, taken as a whole, deserves first prize, although it would not be well to carry the roadway under the pier as suggested."

The author of the design writes in his "report,"—

"It will be seen by the plan that the beach is not interfered with more than is absolutely necessary for effecting the required objects, and does not alter the natural features of the cliff in any way, and, except at very high tides, the beach will have a broad expanse of sand outside the marine drive."

"There are twenty rustic concrete sheltered seats provided under the cliffs, with seating accommodation for eight persons each, or sufficient for 160 persons, and seventeen rustic shelters glazed with oak seats on the south side of the promenade upon a kind of barbican, with seating accommodation for sixteen persons each, or sufficient for 272 persons, making a total of permanent seating accommodation for 432 persons."

The drive is formed of tarred macadam at 4s. a yard; the footway of tar paving at 2s. 9d.; the sea-wall of concrete at 13s. 6d. per yard cube, and the lighting is by seventy gas-standards.

The estimate is for drive 33,270*l*. 6s. 8d.; for cliff works, 1,872*l*.; total, 35,142*l*. 6s. 8d. As regards the cliff drainage he says,—

"This part of the proposed work is the most important to deal with. In the first place, if the cliffs are over-drained the sand will become so dry that it will very soon be blown away, which is seen to be the case in many parts of the cliffs. In the second place, if sufficient drainage is not done as early as possible, before very long there will not be any walks past the coastguards' station and the Royal Bath Hotel. I have provided seven deep sumps, as shown on plan, to be dug from the top of the cliffs down to the mean sea-level, with adits driven in east and west at the top of the clay strata, thus tapping the source of the springs which crop out on the sea face, causing the wasting of cliff at those points. The sumps are of sufficient capacity below the top of clay level to hold the rainfall, which is 26 in. to 29 in. per annum, to get rid of the water by percolation at the sea-level, which is always found to be the case where water at such a little distance from the sea will keep lower than the ordinary sea-level; and the other part of the drains I propose to have open channels leading diagonally down the face of the cliff to the back of the wall, thence under road to face of wall, which will prevent the furrowing and destruction of the cliff front. To preserve the face of the cliffs, it is proposed at all those places where the various kinds of earth are at an angle of rest to spread mould mixed with road sweepings over the cliffs, and then sown with sea sand grasses as a land winner, and planted with such kinds of shrubs as I believe would thrive."

In comment upon this we must say that the sea-wall seems deficient in mass, and is based only *on* the clay bed under the sand, instead of entering, as it ought, several feet *into* it, thus saving greatly on what we think a sufficient estimate should be for that part of the work. And with regard to the cliff drainage, we are quite unable to think that this outlay of less than 2,000*l*. can suffice; the adits at the clay-level are not described as to length, &c., and we are confident that these must extend the whole length of the broken clay-bed. The design is no doubt a meritorious one, in many ways, but, for the reasons named, we consider the estimate inadequate and misleading. There has been a good deal of local correspondence since the award, and it has, we think, been distinctly shown that the spaces for bathing-machines are very inadequate in frontage, and will lead to a very undesirable crowding together of the bathers, who will too, at high tides, be fully in sight of the road.

No. 8, "Ad Rem," the second prize design, of which Sir J. Bazalgette writes:—

"Next should be classed the design of 'Ad Rem,' which proposes also a 30-ft. road and a 10-ft. esplanade raised 9 ft. 6 in. above mean sea-level. It provides four lengths of inclines in convenient places for boats and bathing machines, giving an aggregate length of frontage to the sands of 2,210 ft., and twenty-eight flights of steps, each of about 90 ft. length of frontage, or a total of 2,520 ft.;

and the line of wall is broken by thirteen projections with sheltered seats and steps to the sands."

This design has a better-designed sea-wall than the last, founded in the clay, but still not deep enough. There is a stone (or concrete block?) guard-wall at the foot of the cliffs and back of the drive, which would, we think, prove of little use, so far as waste of cliffs is concerned. The drive surface is of tarred macadam, at 1s. a square yard; the footway of asphalte, at 10d.; the sea-wall of Portland cement concrete, at 11s. per yard cube, and 13s. 6d. (we presume per yard lineal). There are thirty-two sheltered and seventy open seats, and seventy-three gas-standards. This design stands fourth as to estimated cost, being put at 23,572*l.* 10s. for the drive, and 4,953*l.* for cliff works, making a total of 28,525*l.* 10s. We consider the walling would need a considerably increased rate for security. There is little of much moment in the competitor's "report," as regards the drive, but with respect to the cliffs and their waste, he is of opinion that it is possible to stop the future formation of "chines," and to reduce to a minimum the surface damage by wind and rain. The general drainage is dealt with, and his scheme suggests,—

"(*a*) In the case of depressions in strata, and considerable quantity of water, to absorb and catch the water, before it reaches the front, by shafts behind the cliffs.

(*b*) In other cases, to intercept and cut off back water on intermediate levels by adits driven in over the benches of impervious strata, and also by forming collecting-drains on the benches themselves.

(*c*) To intercept the water running over the top of the cliffs by a drain, in the positions shown on the plan.

(*d*) By a series of small surface-drains, to intercept and carry down small quantities of water which may pass the previously-described works, and which may collect from rainfall upon the surface of the cliffs themselves."

This shows (with too the item of nearly 5,000*l.* appropriated to this use) a better apprehension than usual among the competitors of the difficulties to be encountered, and a better promise of meeting them; and the paper closes with observations on the necessity of treating each part of the cliff according to its local peculiarities, with too a reference to *planting* on the cliff face, which we think not very much to the purpose; but the design is one of the best thought-out among the whole submitted.

No. 9, "Fidelitas vincit," takes the third premium, and stands fifth in the range of cost of estimate. Sir J. Bazalgette writes of it:—

"The third place should be awarded to 'Fidelitas vincit,' which provides a roadway 31 ft. wide and a footway of 12 ft.; but raised only 8 ft. above main sea-level. The line of sea-wall has twenty-seven flights of steps, each giving 150 ft. of frontage to the sands, or a total length of 4,050 ft., but each 300 ft. of wall is broken by circular projections for seats. The approaches to the pier are well arranged."

The drive is proposed to be formed with 9 in. of gravel, and the footway to be of tar paving; a circular drive, with a band-stand in the centre at each extremity, and this seems the only design in which urinals are provided, or at least named. The estimate comprises 19,573*l.* for the drive, and 9,077*l.* for cliff works,—a much more likely amount, we deem, than most named, making a total of 28,650*l.* We have a note as to the pier approaches in the same terms as the arbiter employs. The design for band-stands is, we consider, uselessly elaborate, but the cue may, as seems the case in other instances, be taken from the overdone style of the existing pier offices, showing how evil example bears fruit.

The selected designs are respectively the work of (1) Mr. John Stewart, C. and M.E., temporarily resident, we believe, at Bournemouth in connexion with railway contracts; (2) Mr. T. J. Scoones, A.M.I., of Bristol, who has designed a similar work for Weston-super-Mare; (3) Messrs. Rowell & Harding, C.E., of Wimbledon.

A very general resemblance almost of necessity pervades the designs, with a very general defect also as to sufficient depth of foundation for the sea-wall, a point greatly affecting the estimates. More difference exists in regard to the treatment of the cliff drainage.

No. 13, "Archimedes," is remarkable for its sheaf of some forty or more sections of drive, &c., which might well have awaited an order to prepare working drawings.

No. 14, "Utility," is a very careful design with a good sea-wall, formed on a flat curved batter, but still wanting depth in the clay bed. The sheltered seats are well designed, but some "carpenter's castellated" detail disfigures parts of the accessories. The system of drainage for the cliffs is about the best thought-out of all submitted.

No. 18, "Say ye and do ye," has the road raised between two retaining-walls, clear away from the cliff, an arrangement well worthy of consideration. The sections do not show the clay level, nor is the cliff drainage detailed in the drawings, being probably left for explanation to the written report.

No. 20, "Progress," and No. 21, "N.B.," both have better sea-walls than most designs, and both carefully detailed. No. 20 a good deal in the style of the existing pier, an example more honoured in the breach than in the observance.

No. 24, "Labore Vinces," is a very careful design; the road carried on flat segmental concrete arches of some 30 ft. span, admitting of the flow of the tide within them. An overcliff drive is also provided for, carried in part also on arches filling in between projections of the cliff. While doubting the perfect security of this scheme, we must admit the picturesque effect it produces. This design rises to an estimate of 68,142*l.*

The remaining designs present no features calling for particular notice except that they rise in the amount calculated for their execution until "Prudentia Simplicitate" reaches a total of 116,741*l.*, more than five times that of No. 1, "Steadfast."

Since these notes were begun it has transpired that the design "Utile Dulci," to which the first premium was awarded, is a reproduction of one prepared by the local surveyor for the Commissioners some time ago, and lent, for the purpose of putting into form for competing, by its author, to Mr. Stewart, and drawn under that gentleman's inspection, by the surveyor's son, in his overtime, Mr. Stewart at the same time being engaged on the design we have noticed under the motto "Utility." The question was seriously mooted by the Commissioners whether their surveyor had not broken faith with them, in this use of his design, and they submitted that question to Sir F. Bramwell, who, asking himself a legal opinion, gave as a result his view that there was no breach of duty. However, it seems a pity, if the surveyor wished to help a friend by the use of his design, he could not keep his counsel when the design proved the most successful, as the result is that neither his friend nor himself gain anything; the award, it appears, being set aside, the second premiated design, "Ad rem," being now put first; the third, "Fidelitas Vincit," placed second, and a new third prize plan having to be selected by Sir J. Bazalgette.

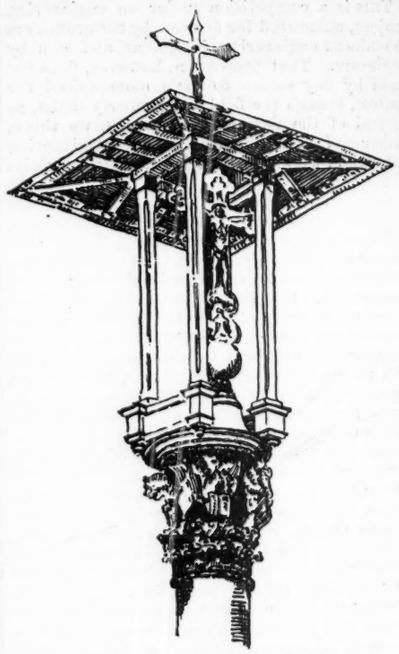
This scheme if carried out will at once and for ever alter the sea-front of Bournemouth from a natural and picturesque one to one artificial and formal, and with, in our opinion, a very uncertain prospect of real advantage. The cliff drainage, to secure the face from waste by falling, will, we are convinced, prove a much more difficult (if, indeed, at all practicable) problem than it is generally thought to be, as the level of the retentive clay-bed is variable in an extraordinary degree, and much of its concealed character as yet unknown; while on a complete exploration of its peculiarities only can any at all reliable system of drainage be founded. The cliff-front also being subject to the destructive action of both rain and frost may completely baffle all attempts at its preservation; and it must be remembered that this drive, being devised very much as an invalid resort, any proof of insecurity through its invasion by heavy falls from the cliff above it, would surely lead to its desertion for such a use, and the loss of that accession of visitors which it is aimed to secure, and render the outlay upon it an unprofitable burden to the town.

Brentwood.—The foundation-stone of a new drill-hall for the F Company of the First Volunteer Battalion of the Essex Regiment has been laid. The plans for the building were prepared by Lieut. E. N. Cubitt, of Brentwood, who is acting as architect and surveyor, and the work has been entrusted to Mr. William Wood, builder, of Chelmsford. The first section only of the building is at present in hand. This will comprise a basement containing a temporary armoury, with a dressing-room on each side, and above the basement, which is at the far end of the building, will be a stage 20 ft. by 30 ft., to overlook the spacious drill-hall, 80 ft. by 50 ft. This forms the first portion of the scheme, and the cost will be 1,200*l.*, or, including a proposed residence for the Sergeant-Instructor, with recreation-rooms and armoury, 2,000*l.*

ITALY: FOR STUDENTS.*

In times that are now somewhat distant, but not beyond living memory, the architectural student, whatever he may have neglected, was not allowed to overlook the great works of Imperial Rome, which furnished the most important items in his stock of ideas. Nor could he easily overlook the styles which, after the revival of learning, grew naturally on Italian soil, and were more or less adapted to the wants of modern life. Men who seriously intended to fit themselves for the profession of architecture went abroad for many months, and even for years, the main object of their journey being to become thoroughly familiar with Italian architecture of the Classic type. Since those times one and another phase of architectural thought has had its day and its decline; but there has been no period in which the architecture and kindred arts of Italy, ranging over some twenty centuries, have failed to influence very materially modern architects. It would be wasting time to dwell now on the importance of such studies. Those who feel no warmth of interest in them, those with whom a journey to Italy has not been the dream of their student life, would not be brought to a better mind by anything we could say in these few minutes.

But while these studies have more than held their ground, while English architects have, during the last half-century, enormously increased, and buildings that claim some architectural character have increased still more, the number of those who have sought their knowledge of Italian art at the fountain-head has undoubtedly diminished, so that at the present time a vast and ever-growing majority are dependent on books and pictures for their knowledge of some of the most remarkable manifestations of genius of which the history of architecture has taken any account. Now between the period to which I have referred and the present day, the art of travel has progressed enormously, and yet, through the unaccountable neglect of opportunity by the great bulk of English architects, railways, and all that belongs to them have, so far as personal contact with Italy goes, existed in vain. As it happens, we are able to measure this improvement in the means of travel very precisely.



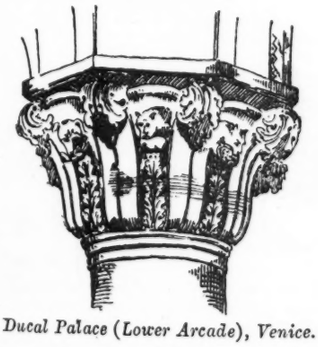
Upper Part of an old Shrine in Florence.

In the month of November, 1834, the same year in which the Royal Institute of British Architects was founded, the late Sir James Hudson made his celebrated swift journey to Rome, carrying the offer of the post of Prime Minister to Sir Robert Peel. After an amount

* A paper by Mr. Thomas Blashill, read at the meeting of the Architectural Association on the 6th inst., as elsewhere mentioned. We have interspersed the report of this paper with various small sketches as a kind of marginal commentary on it; they are taken from the sketch-book of Mr. H. A. Gregg. The views of Florence and of the Claudian Aqueduct, and the mosaic figure, are photo-printed from photographs.

Florence.

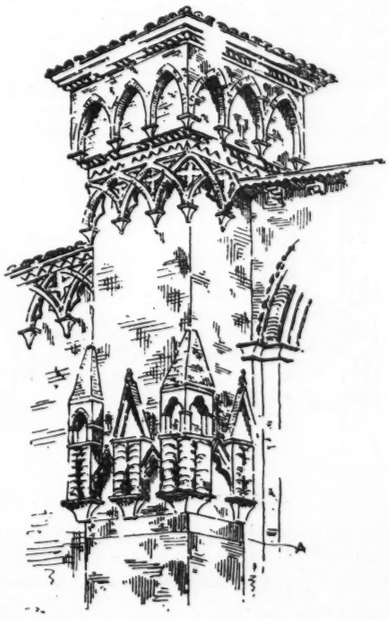
of exertion and endurance that can now hardly be necessary in any civilised country, he arrived on the ninth day. How far the most fortunate of travelling students of that time fell short of this headlong speed may not be precisely known; but a journey in which he would see even the limited list of things then thought essential was a very costly enterprise, and a serious break in the routine of his life. But any ordinary passenger who started for Rome direct before noon on the day before yesterday, would arrive before noon to-day,—in hardly more than two days,—and may have easily driven before dinner through all the most celebrated localities of ancient and Mediæval Rome, and enjoyed some of the finest and most suggestive views to be seen in the world. Except for two nights spent in the train, his land journey will have been free from all discomfort. He will have



Ducal Palace (Lower Arcade), Venice.

traversed, at a very leisurely pace, some of the finest lake and mountain scenery in Europe, meals always waiting for him at meal times, and with no need to use a word of any language but his own. The travelling student who desires to make stoppages on the way can avail himself of the same speed, comfort, and economy.

Other facilities for study have increased vastly beyond this proportion of four or five to one. Except for the rather cold, but needful, treatise of Sir William Chambers and some other books, to which not one in a dozen men like ourselves could have got access, the travelling student of fifty years ago would have to sketch and measure for himself any Classical building from which he desired to learn. Street's "Brick and Marble Architecture of Italy" had not then come as a revelation to ordinary minds. There is now probably no class of work in Italy that is not fairly well illustrated by sketches, by drawings to scale, and by photography,—an entirely modern art,—so that you may possess at the cost of a few pence more valuable information about a building than can be put into the most careful drawing. Besides our own library, those at South Kensington and the Institute are easily accessible to all students, and if any really use-



One of the Buttresses of the Frari Church, Venice. All in red brick, excepting corbels and lower band, A.

ful book is absent from the last named, I will answer for the willingness of the Library Committee to beg, borrow, or, if necessary, buy it for them. Sketching, as an intellectual exercise, can be practised near home, and though it is of infinite value for fixing on the mind a knowledge of the characteristics of a foreign style, it is no longer necessary in every particular instance, for the details and proportions of a building are caught and fixed by the camera a good deal better than can be done by hand. Now, the proper use of all these appliances is not to act as substitutes for the inspection of the things they represent, but as records of what we have actually seen. They are useful as an artificial memory to give life and interest to all that we may read after about the originals. It is only by seeing these originals that any very useful notions can be formed of them, and this personal contact with them we persistently undervalue and neglect.

When I was last in Rome I inquired of persons who would be most likely to hear of the visits of English students, and found that some half-dozen per annum was all they knew about. French and German students go in very considerable numbers,—the former having a share in the costly establishment maintained

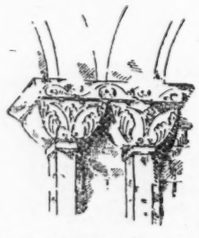
St. Mark's Church, Venice.

by their Government in the Villa Medici, which advertises the fact by its fine position on the Pincian Hill. Our own Royal Academy sends one architectural student in two years. The Institute has two annual travelling studentships, and this Association has one, which may help the winners to Italy if they are so disposed. By the kindness of Mr. Aldwinckle, we have an additional one for this year, but, both this and our own studentship are limited to the very months when Rome is avoided by all prudent travellers, so that Mr. Aldwinckle's special studentship for Italy, which the Institute can award this year, is the only one that, if awarded, insures a visit to that country. I should be surprised to find that a dozen English architects per annum get there at their own cost.

In these circumstances, I have for some time

past advocated a systematic arrangement for such visits,—visits arranged specially for those who, up to this time, have never gone to Italy, and who are not likely to go on the usual terms as to time and cost; visits that will occupy weeks instead of months, which will not seriously interfere with office arrangements, nor cost more than the ordinary student can afford. I would, indeed, set before every pupil in architecture the near prospect of seeing for himself, if only for a short time, the very objects that he is studying from books and pictures, perhaps with no very great enthusiasm. As the young doctor gets his anatomy from real bones and tissues, as all other students acquire their knowledge by actual inspection of the things that are needful to be known, so should the student in architecture see the objects of his study, not through pictures only, but with his own eyes.

Such a system as I suggest would in no way interfere with the ideas of the travelling student who can go for a longer term. On the contrary, I hope it would tend to encourage him, for it would render the details of travelling



St. Mark's Church, Venice.

more popular among us, and therefore more easy, and the man who could do good work while on an extended tour would, on his return, find an audience well able to appreciate his results.

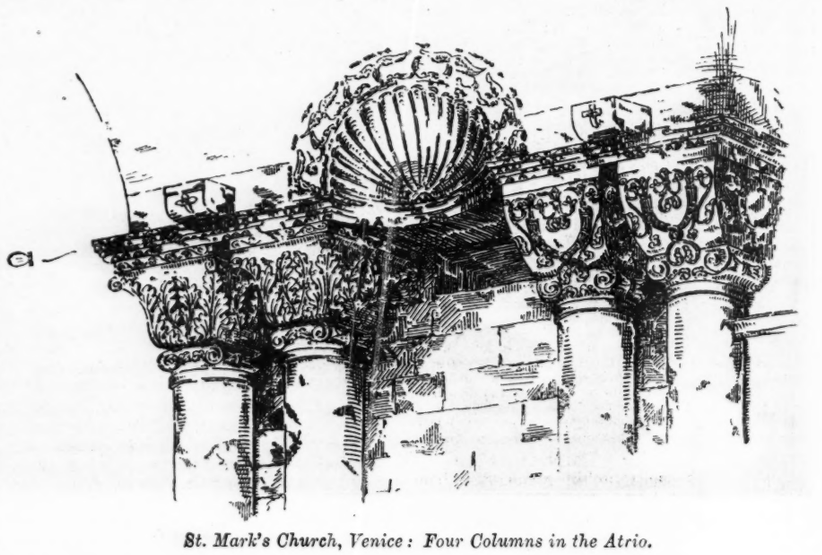
I hope, therefore, that we may gain the cordial co-operation of some of our more fortunate friends, though I am well aware of the objection with which the suggestion of these short tours will be met. Some years since, when I was thinking of a journey that would only allow a stay of six days in Rome, I applied to several friends for advice. The most candid of them gave me the inner mind of all. He said, "My dear fellow, don't do anything so ridiculous. Wait till you can go thither for six weeks. You will come away, as I did, with the tears in your eyes." I will only say of this advice that it had the effect of being impracticable. If I had listened to it I should have been waiting now. It is bad advice, however well-intentioned; for it fails to take into account the actual circumstances of young men who are carrying on their professional education probably under some difficulties, and have a very serious list of things against each of which they must write "done" before they can pass the examination to which they are now

Cornice, St. Mark's Church, Venice.

subjected. It is chiefly for their sake that I offer this paper.

What is the amount of time and money that the ordinary architectural student may be expected to afford for this one item in his professional education? I believe that few will be able to get away for more than three weeks at one time, or to spend more than 20*l.* or 25*l.* upon one journey. Adopting these figures, I propose to show what may be done in the time at that cost.

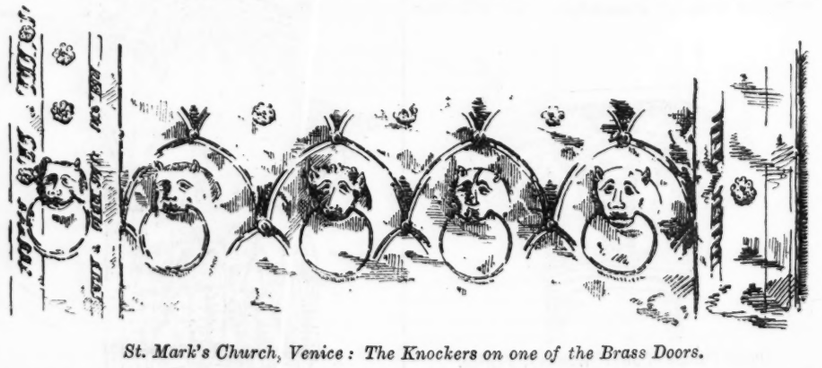
Out of twenty-one days four will be spent in travelling, leaving seventeen days available for work. On the map of Italy the roads to Rome are beaded with towns, the meanest of which has some claims to be visited. Of large towns Turin will best bear to be omitted, for though pleasantly situated and provided with fine modern arcaded streets, there is nothing that cannot be seen to better effect in other towns. Milan, Florence, Pisa, and Genoa are the places most likely to be selected for a short stay; but Siena, Perugia, Orvieto, Assisi, Pistoja, Bologna, and Piacenza contain work that may cause either of them to be chosen. If, out of our seventeen days, a week is given to Rome, five or six of these towns may have from one to three days each, Florence being made the chief object after Rome. The cost of a second-class circular ticket will be 13*l.* or 14*l.*, with a saving of about 35*s.* if the Newhaven route is adopted. The bare expenses of living at hotels, according to the experience of some of our friends, will be from 8*l.* to 9*l.*, and if we allow 2*l.* for purchases, the total cost for the tour will be within the limits I have named. But it is possible to see Rome, Florence, Pisa, Geneva, and Turin on much easier terms. I can state



St. Mark's Church, Venice: Four Columns in the Atrio.

that the actual cost of a journey (*viâ* Newhaven) which occupied seventeen days, of which six were spent in Rome, was (exclusive of purchases) about 18*l.* Such a journey was rendered possible by a new system of excursion trains, of which three now run annually at Carnival time, Easter, and Whitsuntide, at fares of 4*l.* from Paris to Rome and back. I went with two pupils on the first of these excursions, and we had every reason to be satisfied with the arrangements made by Messrs. Cook & Son, who provided hotel accommodation and a good many other things that we could not have managed so well without their help.

If the three weeks' tour can be extended for a few more days, Naples, the busiest city in Italy, can be seen, with Pompeii, Herculaneum,



St. Mark's Church, Venice: The Knockers on one of the Brass Doors.

and the Greek temples at Pæstum. The neighbourhood of Naples abounds with Roman remains, and some of its churches are remarkably rich in Mediæval sculpture; but there is no reason why the time available for Rome should be diminished for the sake of seeing these things, which may very well be left for another opportunity.

Taking Milan as starting-point, another tour may be made amongst the towns in North Italy that lie within sight of the Alps and the interest of which is chiefly Mediæval. The chief of these are Brescia, Verona, Vicenza, Padua, and Venice. Mr. Street was probably right in considering Florence, Verona, and Venice of about equal interest in their very different kinds. He who is well acquainted with the history of Italian art during the period of the Early Renaissance will prefer Florence. The architecture of Venice can be appreciated without any very elaborate preparation, and the whole aspect and arrangements of the city are strange and full of beauty. Verona has that kind of beauty which tempts one to sketch rather than merely rest and admire. As to Vicenza, which is sacred to the memory of Palladio, I should rather advise the student to read carefully all that Street says to extenuate his neglect to visit that town,—then to make a short call there himself,—as Street did on another opportunity. Out of seventeen days in Italy, Venice may have a week. Ravenna may be seen either on the tour to Venice or that to Rome. Its churches and baptisteries are filled with mosaics, six or seven centuries older than those in Venice. The cost of the three weeks' tour, including Venice, should be under 20*l.* I have seen an estimate of a tour twice that length over the same ground, that would cost only 30*l.*, including purchases.

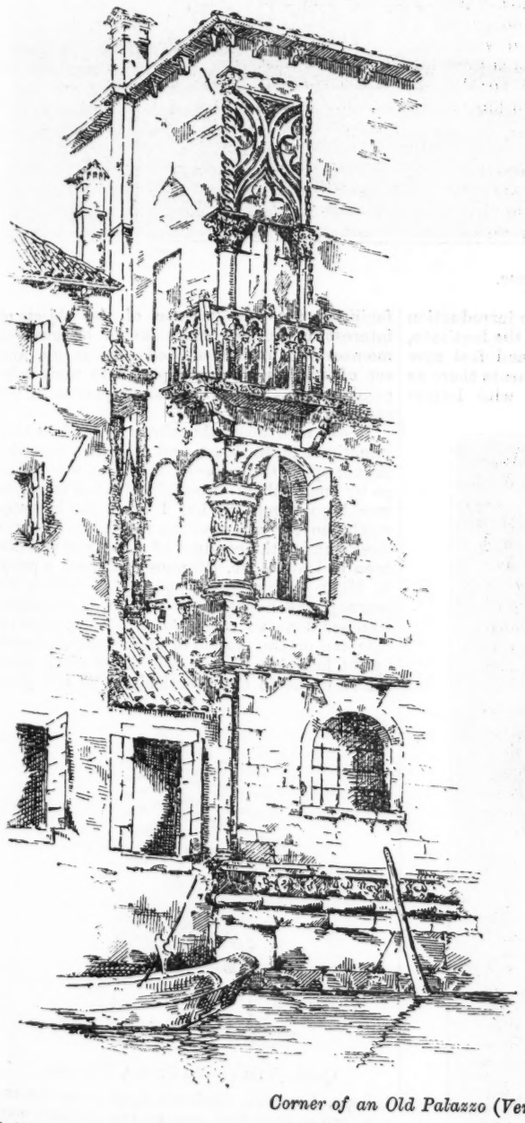
I may meet the common objection against hurrying over these most interesting routes, by saying that there is really no hurry in the business. It is true that you cannot see so many things, nor return to the same thing so often, nor take so many notes, as if the time were longer; but all that is done may be done easily in the time allotted to it, and we must not expect that one sovereign will go as far as three. The first edition of Street's "Brick and Marble Architecture" "was the work," as the author says, "of a little more than one short month," which may perhaps mean, at most, five weeks; but a great deal of that time was occupied in very slow travelling and many stoppages at small towns. I have no doubt that half a dozen Italian towns could now be as well seen in three weeks.

We may now consider what the student may reasonably be expected to do on one of these short tours. He could not make elaborate studies of particular buildings, nor take sketches of everything that he might wish to remember, nor explore places of antiquarian interest; but he would make himself well acquainted with the most valuable example in each locality, and not to be entirely dependent for the future on illustrations for his knowledge of them. I am, of course, supposing that each

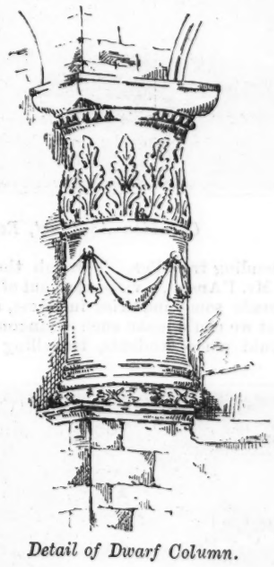
one would prepare himself well before going away by consulting the best works on the places to be visited, and that he would pursue the subject after his return. In that way, there should be no difficulty in his acquiring a really useful knowledge of the styles which he has been able to study from their best examples, and for the future he may venture to have an opinion of his own, whereas he has previously had to go by the opinions of other men; but there are many things that he would learn besides the details of styles.

One of the most striking peculiarites of our fellow-countrymen is their fear of big things. Let a young architect have his way, and he is far more likely to contrive some little piece of furniture than a building or monument of grand dimensions. Set him to design some large building, and he will probably manage to make it look like a group of five little buildings, designed by as many architects, at intervals of half a generation apart. One visit to Rome will teach him something about the effect of grand dimensions. The Pantheon would contain in its one room a couple of ordinary-sized London churches, with their towers and spires, and plenty of room to spare. The Baths of Caracalla, the Colosseum, the great structures on the Palatine Hill, Hadrian's Villa at Tivoli, the great basilica of St. Paul outside the Walls, cannot fail to afford useful lessons, and though mere size may be vulgar rather than sublime, the man who has seen these things will be a better authority on such a question of taste than the man who has not.

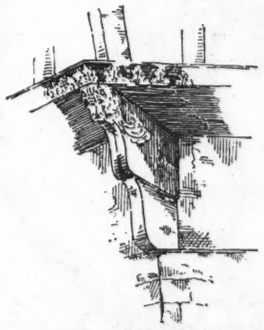
Another very remarkable characteristic of Englishmen in recent times, is their insensibility to beauty in the materials of a building. Our old mansions and town houses were fitted with mantelpieces and hearths of handsome breccia and veined marbles, which were also used in monuments, until the taste died out with us. On the Continent we find everywhere marble window-sills, dadoes, and columns. I have seen in the remotest corners of Holland marble steps and pavements in little common shops and at cottage doors. Our general range of choice is from rubbed Portland to tooled York. In the ruins and the churches of Rome there is a most magnificent collection of coloured marbles and hard stones,—porphyry, green serpentino, cipollino, verde antique, Africano, giallo antiquo, pavonazzo. Enormous blocks of the hardest porphyry, that can only be cut with diamond or sapphire, have been sculptured at an incalculable cost. Such churches as those of the Certosa of Pavia, the Scalzi and the Gesuiti at Venice, enable one to judge how far this was worth while; but only those who have seen them can so judge. The same may be said of the abundance of gilding and coloured decoration, of which the church of the Anunziata at Genoa is an extreme example.



Corner of an Old Palazzo (Venice).



Detail of Dwarf Column.



Detail of Angle Corbel of Balcony.

Mr. Brindley, of the Westminster Bridge-road, with whom I looked over some of the marbles in the churches of Rome and Naples, has been so good as to lend us some instructive examples, chiefly of antique marbles. The sources of many of these have lately been rediscovered, so that the quarries from which the Romans got their wealth of marbles and harder stones are now only waiting the commands of those who take pleasure in them. I have no doubt that with a proper demand for marble flooring materials, they can be delivered in London cheaper than in Rome.

St. Mark's at Venice contains two acres of mosaics. How many acres of opus Alexandrinum (the pavement of which we have one specimen in the choir of Westminster Abbey) may exist in the churches of Rome I know not. The great frescoes in St. Peter's have been reproduced in mosaic, which is made to copy slavishly the touch of the painter. In all ages the Romans have gloried in beautiful pavements, the tesseræ hard and thick, and of fine contrasting colours. After a night's rain I went out early and dug from the macadamised roads as many examples as I wanted of stones once actually used in floors and wall linings. These things should be seen once at least in a lifetime.

An afternoon spent in Genoa will enable one to see such examples of noble entrance halls,

Angle Corbel supporting Pulpit, Church of Sta. Stefana, Bologna.

Eaves Moulding, Bologna.

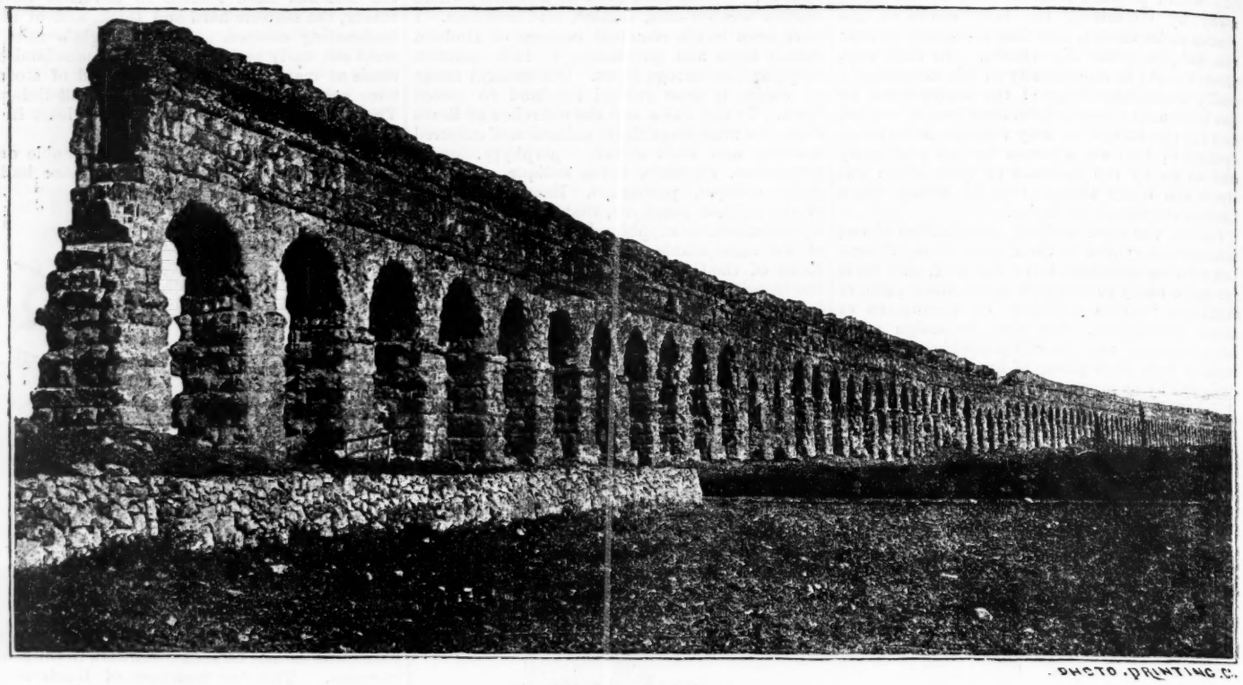
pillared courtyards, and marble staircases of palaces as cannot be seen elsewhere in the same compass. The fine staircase of Goldsmiths' Hall gives us an idea of what one kind of Italian staircase is like. Such brickwork, often mixed with marble,—as we see at Verona, Padua, and Piacenza,—is particularly instructive for those who work in a brick country. The arcades which, as in Pavia and Bologna, line the streets, are worth more attention than they have ever received in our climate, where they could give shelter from the rain, though the few attempts to naturalise them here have mostly failed. I might give a long list of things that strike one at first sight, and need no long contemplation to impress themselves on the mind.

Now, the practical question is,—What ought to be done to increase our knowledge of Italy on the terms I have suggested,—if such suggestions are worth consideration? If asked the best time for a young man to visit the great examples of Classical architecture, I should say, As soon as he has learned enough as a pupil to enable him to appreciate what he will see, and to make it a part of his education. He will learn more from books and classes after such a visit than he could possibly do before. When I was going through the architectural course at University College, we had amongst us the Count de Paris, who had already travelled a good deal. Occasionally Professor Donaldson would stop in one of his descriptions to say, "You'll remember, monsieur, this fine hall,—or portico." I thought how much better it would be for them if the whole class would respond, as the French Prince did, to these pleasant little reminders,—better, perhaps, for the Professor as well. There is a venerable superstition that has done a world of mischief: the idea that you should fully explore your own country before going abroad. You should not neglect English

Sta. Stefana, Bologna.

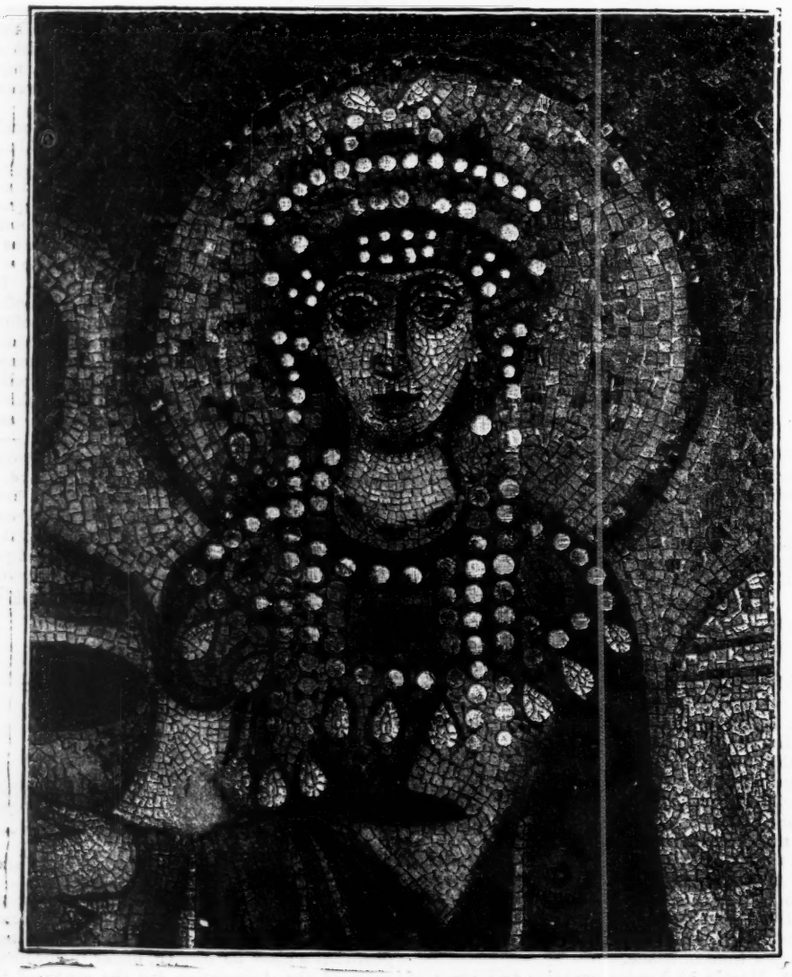
Archivolt, Bologna.

architecture, but go abroad as soon as you get a chance. The mode of arranging for a journey to Italy remains to be considered. I should suggest that a class be formed, under the ordinary rules of the Association, for the study of the whole subject. You will want to know all about routes, fares, and hotels; to determine on the towns best worth seeing, and the most notable buildings in each town. I always like to know my way about a place before I set foot in it. This only involves a careful study of the map, which is amply repaid. If any interest is felt in



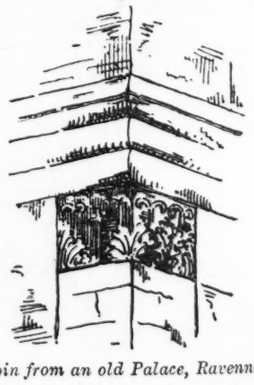
Claudian Aqueduct, Rome.

this subject, we should have no difficulty in arranging special terms as to hotels, and getting a kind of "house of call" in the larger Italian cities. Our past-president, Mr. Phené Spiers, has for years past helped many of us with these small details of information. He tells me he is now prepared to open a register at the Royal Academy for entering them, and also all the objects of interest that might be overlooked, which register he will be happy to show to any intending traveller. Through the introduction of Mr. I'Anson, a vice-president of the Institute, I made some inquiries in Rome, and feel sure that we could make such arrangements there as would place students, travelling with letters from the Association, in communication with the resident English artists using rooms and books of reference to which we might make such contributions as our use of them might justify. I have no doubt also that special facilities for seeing some of the objects of interest in Italian cities would be given to members of a recognised body such as this. Any set of friends who may prefer to work independently may gain a good proportion of the same advantages.



Mosaic, Church of San Vitale, Ravenna: Head of Empress Honoria.—Sixth Century.

I have mentioned the cheap excursions that sometimes go to Rome, and I think a man who cannot spare three weeks might do worse than go by one of them, especially if a few comrades would go together; but I think the best way would be for a few young men to go for three weeks under the conduct of some one who has been in Italy. Mr. Stannus took such a party to Milan a few years ago, and I believe the journey was a great success. Our President, who has done so much for this Association by carrying on the system of excursions originated by the late Mr. Sharpe, will know much more than I do as to the practicability of this plan.



Quoin from an old Palace, Ravenna.

I hope, however, that we shall make the excursions so easy that one or two students may be able at any time that suits them to go to Italy with such special advantages as we may be able to get for them.

I will add a few practical hints on other points. The best time to go to Rome is in the winter, or, at least, avoiding the four summer months. I should prefer to arrive just after Easter, when the crowd of English visitors is leaving for the north. Naples is getting unbearably hot by the month of May. There is nothing specially attractive in Rome at Easter. Florence is pleasant at Easter, just before it begins to fill with visitors. Venice and the northern towns may be visited at any time if excessively hot seasons be avoided. The climate, especially in Rome, is very treacherous. You have to use warm clothing, and keep out of cold winds, and not to go out of the heat of the sun into cold buildings thinly clad. At any time of the spring and autumn a downpour of rain may set in for a week.

I might give a list of books useful for study; but every one who has the idea of going to Italy may see such a list in the Calendar of the Institute for this year (page 67), and will know where he can consult the books, choosing them according to the special branch of architecture he may have in his mind. To further encourage him (I give this hint especially for the benefit of any who may not be quite awake to what will soon be expected of them) the said Calendar points out that the candidate, whatever his favourite style may be, should be familiar with the principal works of Brunelleschi, Bramante, Sansovino, San Michele, Palladio, and Vignola, besides Inigo Jones, Wren, Chambers, "and other great masters of the art." Now, my idea of becoming familiar with a building, is to go and see it,—in and out,—and to do this you must go to Italy on the best terms you can; but if you read through the eight pages of that Calendar, which lays down the various branches of education in which a candidate for examination should show his proficiency, you will probably agree with me that he had better get his Italian experience systematically, cheaply, and quickly, so that he may have time and means for other necessary, though, perhaps, less delightful, tasks. If he sees his way to make a more prolonged tour, I should be sorry to advise him to make it shorter; but I would by all means encourage those to whom a long tour would be a very serious difficulty, to go when they have a chance, to go again and again if possible, so that they may get some idea of the beauty and the grandeur of the works left to us from past ages in the cities of Italy.

[For a report of the discussion which followed, and for extracts from letters by Mr. Aitchison, A.R.A., and Professor Roger Smith, see p. 698.]

THE SURVEYORS' INSTITUTION.

The opening meeting of this Institution for the present session was held on Monday evening last, when an address was delivered by Mr. Edward I'Anson, President.

Mr. I'Anson, in the course of his address, said:—The report of our Council, presented to the last general meeting, sets forth so fully the increase during the past official year of the number of new members, the loss by death of old members of the Institution, and our financial condition, that it is unnecessary for me to offer any observation on these points, nor on the substantial results which have been derived from the system of Examinations which has now been established for five years; but I may just note that, after being established only twelve years, this Institution obtained a charter, under which we have worked for five years, having now close on 1,200 members, and a library of special books containing about 3,500 volumes. This may be a fitting place to allude to an impression which I understand to some extent exists, that membership is no longer obtainable except by examination; and although this is true as regards Professional Associates, it does not hold in respect of surveyors already in practice, to whom the Fellowship remains open on the old terms for another five years.

You are aware, gentlemen, that my own professional practice has not been in connexion with land as agricultural land, but with buildings and building land; and even that has been confined to a comparatively limited area, for I am essentially a Londoner. I must, therefore, rely on your indulgence if you find me ignorant and wanting in that branch of our profession which deals with the great interests involved in agriculture and farming; but the wise constitution of your Institution is such that you admit members who practise in any branch of the profession of surveyor, and, as each branch requires a special knowledge, we can hardly be proficient in all.

Born, as I was, in the City, and having lived there all the days of my youth, and having there carried on my professional work, naturally my experience has been chiefly of City of London life; and it may not be uninteresting to look back and think what a vast amount of professional work there has been in the City of London during the last two generations for surveyors to do.

Consider what London was the two generations ago I have referred to, and how it has imperceptibly grown and increased, until, so gorged is it with traffic, both vehicular and pedestrian, that nothing but the most careful management of the police would enable, in some parts of the City, the choked vehicular traffic to circulate at all; and, as regards foot traffic, as you are aware, in the neighbourhood of the Mansion House, it is proposed to form subways, so as to remove the real danger which exists in pedestrians passing in this crowded locality from one side of the way to the other. All this has come so gradually that it is difficult to realise the London of two generations ago, when, as I recollect, my nursemaid used to lead me as a child to walk either on Fishmongers' Wharf, which extended up to old London Bridge, and had willow-trees growing on the river bank, or to Custom House or Tower Wharf, which was then so near the green fields of Essex, that the sweet scent of the new-made hay was wafted from them.

It was some twenty years after the Napoleonic Wars ceased with the battle of Waterloo before any decided start was taken in civic improvements, somewhere about the time the old Houses of Parliament were burned down. London improvements had, however, begun then, but the development has been much greater since, and has certainly furnished, since about 1836, abundant employment not only for surveyors, but for architects also, who since then have had much of old London to rebuild; but, while the surveyor's work in city improvements can hardly be again what it has been, there still remains much for the architect to do in rebuilding many of the city houses, which, for the most part, date back to the Fire of London in 1666, and, although still structurally sound, are unfitted to the requirements of the present time, and unprofitably occupy much valuable ground.

As regards the value of land in London, I do not think it has declined, but it is not so elastic as it was some fifteen or twenty years ago; in the best parts of the City of London it still maintains its value, and, although it has often realised and still does realise 30*l.* a square foot, and has even under special circumstances reached 40*l.*, a point it had reached several years ago, there it remains. Of course rentals are high in proportion to the large value of the land, but, large as it is, I believe it does not materially vary from the value of land in the other great seats of commerce and industry, such as Paris or New York; and I was struck, when some years ago I visited Moscow, to find that the land in the great bazaars realised much the same price as in London. The area where these large prices are obtained is very limited in London, and although at present there is a decided want of elasticity, still, however, as new streets are formed and new or improved lines of thoroughfare opened up, increased values are obtained; but I consider the greatest improvements in value are about the north-eastern parts of the City of London in a line between the City and the vast dock extension which is taking place.

What is, however, most noticeable is the immense development of houses in the suburbs, some idea of which may be formed by considering the District Surveyors' annual returns. The number of districts into which the area under the control of the Metropolitan Board of Works is divided is sixty-two, superintended by sixty-one District Surveyors,—one District Surveyor, one of the oldest of the body, and elected before the creation of the Metropolitan Board, holding two districts.

The total fees received, which are regulated by the Building Act, vary considerably in amount, the most profitable districts being those which naturally should be so,—namely, those suburban districts where a large amount of new buildings of a small class have been erected. According to the last return I have before me, namely, that of 1883, the fees received in the districts of St. Giles, Camberwell, West Hackney, Hammersmith, and Fulham, were the largest. The district of Fulham produced over 2,000*l.*; at the other end of the scale, one district, being a detached portion of Clerkenwell, near Muswell Hill, produced only 14*l.* 3s. 9d., and some other districts, namely, the Tower Liberty, St. Martin's and St. Anne's, Soho, East Wandsworth and Tooting Graveney, West Kensington, North St. Marylebone, Whitechapel, Spitalfields, with Mile End New Town, Putney, and Roehampton, produced fees under 300*l.*, varying from 117*l.* 8s. 3d. to 286*l.* 9s. 9d.

The number of building operations, including new buildings and alterations to old buildings, was, in 1856, 14,654; in 1883, it was 26,479, as shown by the following statement:—

Year.	Works.	Year.	Works.	Year.	Works.
1856	14,654	1866	20,196	1876	21,910
1857	15,330	1867	21,303	1877	24,288
1858	15,500	1868	21,915	1878	24,529
1859	15,558	1869	19,947	1879	27,271
1860	15,030	1870	18,899	1880	29,249
1861	14,008	1871	18,948	1881	29,275
1862	15,707	1872	18,298	1882	28,519
1863	17,954	1873	17,354	1883	26,479
1864	18,984	1874	19,950		
1865	19,250	1875	20,283		

The year of greatest activity seems to have been the year 1880, when the number was 29,249; the increase in the twenty-seven years from 1856 to 1883, has been in the rates of nearly 14½ to 26½, or considerably over 50 per cent.

The approximate proportion of new works and alterations has been, since 1875, as follows:

Year.	New Buildings.	Additions and Alterations.
1875	8,607	8,384
1877	10,052	8,930
1878	10,445	8,350
1879	10,710	9,882
1880	11,890	11,258
1881	10,331	11,100
1882	9,852	11,395
1883	8,750	11,100

being an average of over 9,000 new houses during the eight years preceding the year 1883. Since then I have no returns to which I can refer. The actual number of building works, as will be seen in comparing the two statements, does not agree, but in the list of new buildings, alterations, and additions, the number given is of those only on which fees have actually been paid.

The district which I hold is the district of Clapham, in the midst of which is Clapham-common, the almost classic ground of the Thorntons and the Wilberforces, and of the other leaders of Slavery Emancipation, and of the Low Church. Alas! how changed it is. And on the common itself,—one of the fine houses which Peter the Great, when he saw them, considered palaces, is now a Roman Catholic nunnery. There is more than one large Roman Catholic school, and close on the verge of the common rises the elegant spire of a beautiful Roman Catholic church. Many of the fine mansions which surrounded the picturesque common have been pulled down, roads driven through the formerly beautiful grounds on which these old houses stood, and rows of houses built on the sites; a tramway runs from the Borough on to the common itself, and a large number of comparatively small houses have sprung up on its western side.

The tramways on the high-road have spoiled it for it for carriages, most of the finer houses have gone, and the glory of Clapham is departed. But the value of the land has enormously increased. Land on main roads which, less than twenty years ago, was not worth more than 1,000*l.* an acre is now worth 3,000*l.*, or more. The green lanes, the trim, well-kept gardens, are gone; and rows of small houses, and towering School Board schools now occupy what, twenty years ago, was mainly pasture-land. I speak of Clapham because it is the district which I know best; but Clapham is by no means the only suburb which has greatly increased in population and value. I believe that in the Hampstead and Highgate districts the value of land has risen considerably higher than 3,000*l.* an acre. What is most remarkable is the immense increase of houses of a small class, and of houses up to 30*l.* to 38*l.* a year in value; indeed, of houses of this class there seems no end.

All this indicates, I take it, a vast increase in the labouring population, and shows a great improvement in the comeliness, comfort, and sanitary condition of the houses inhabited by this part of our population. There is one district, called the Shaftesbury Park Estate, in Battersea, which contains some 2,000 two-story small houses, which, although not well built, are designed with considerable taste, and are placed in well-distributed streets planted with flourishing trees, forming altogether, to my mind, much more agreeable residences than the more substantial, lofty, stone-staircased Model Improved Industrial Dwellings in London, and, I consider, going nearer to realising suitable residences for the poor.

Let me now refer to the works carried out during the last generation by the Metropolitan Board of Works, which was created by the Metropolitan Local Management Act of 1855; and up to the end of 1882, I am, from their

published reports, enabled to give an account of the work done by them.

The following-named are among the new streets which have been formed or widened:—

		Net cost, after allowing for Land sold.
1865.	Garrick-street, Covent Garden	£44,938
1862 and 1864.	Southwark-street	209,000
1862.	Burdett-road, a new street from Limehouse to Victoria Park	38,204
1869. 1871.	Queen Victoria-street, from Mansion House to Victoria Embankment	1,005,303
1860.	Kensington, the widening of High-street	123,323
1865.	Whitechapel, the extension of Commercial-road	201,567
1871.	Hamilton-place, widening, so as to form a better opening from Piccadilly to Hyde Park	110,767
1867.	The removal of Middle-row, Holborn	76,417
1862.	Victoria Embankment	1,144,482
1868. 1869.	Albert Embankment	1,000,692
1874.	Chelsea Embankment	279,978
1876.	Northumberland-avenue	318,438
1877. 1878.	Widening of Wapping High-street and Lower East Smithfield—total cost to 31st October, 1876	672,967
1877.	Shoreditch, the widening of High-street	170,059
1879.	Widening of Bethnal Green-road	140,393
1879.	,, ,, Willow-walk	390,222
1879.	,, ,, Old-street	701,296
1879.	,, ,, Oxford-street	
1877.	Harrow-road, widening at its junction with Edgware-road	154,584
1877.	Newington Butts, widening of street	8,602

This body has also contributed to the expense of the recent very important improvements in widening the east end of King William-street (City), Eastcheap, Little Tower-street and Great Tower-street, and of forming a new street from the southern end of Mark-lane to Trinity-square; and they are at this time engaged in forming a most important line of communication between Regent-circus, cutting through Rupert-street, Dean-street, and Greek-street, all in the parish of Soho, up to Broad-street, St. Giles's.

The great work, however, for which the Metropolitan Board was primarily created was to enable them to carry out a system of main drainage by which the contents of the sewers are prevented from passing into the River Thames within the limits of the metropolis, and to convey them to points many miles below London. Of the magnitude of these works some idea may be formed when it is mentioned that it comprises upwards of eighty miles of main intercepting sewers, some as large as 11 ft. 6 in. diameter, and four pumping stations, two on the north and two on the south side of the Thames, and 165 miles of old sewers have been reconstructed, deepened, and covered, at a total expenditure reaching five millions and a half sterling.

The Thames has been embanked in part, and certainly it is far the grandest embankment which exists, surpassing in many respects the quais of Paris, or the embankments of the Neva at St. Petersburg. The cost of this great work and of the new streets, of which I have already given some details, exceeds ten millions. Amongst the other important works accomplished by the Board is that of rendering the toll-bridges free; a great boon to the public, procured at a cost of one million and a half.

All rights in the already existing open spaces, such as Blackheath, Clapham-common, London-fields, Hackney, Peckham-rye, and others, have been acquired, so that now in and about London the public, of their own freehold right, have access to 1,578 acres of open and, for the most part, well-planted land, which has been acquired at a cost of nearly half a million, making an aggregate of ten millions sterling most usefully and beneficially spent on the permanent improvement of our great metropolis, so that we too may certainly boast, as once did St. Paul when speaking of Rome, that we are citizens of no mean city.

Negotiations are, I believe, pending for the acquisition of a further large area, which it has been thought desirable to add to Hampstead-heath; but, as the purchase-money required amounted to 350,000*l*., this scheme is for the present abandoned.

After giving some statistics of the rise and fall of the rental value of land in Essex, Lincolnshire, Oxfordshire, and Northampton, Mr. I'Anson went on to say:—

Although for agricultural purposes the value of land has so materially decreased, the case is very different in the value of land required for residential purposes. I have in my mind a district on the Surrey hills on the borders of Hampshire, and near to a lofty summit on the old Portsmouth road, called Hind-head, where some land which, for the last generation or two, has been in the hands of owners who were both unwilling and incapacitated from selling has lately come into the market. It is land of no agricultural value, covered with heath and ferns and furze and the whortle-berry, some oak-scrubs, and a few Scotch fir, which twenty years ago, when obtainable, did not fetch more than 5*l*. or 10*l*. an acre. Now, on account of the land having come into the market, and the singular beauty and salubrity of the situation, it realises as much or more than 40*l*. an acre. This is, of course, no criterion of the agricultural value of the land, but rather of the growing wealth of that middle class who are investing in land; and it goes to show that land may have a value outside its value for mere agricultural purposes. This land is more than forty miles from London. Another instance I may quote of the rise in value,—in a district which can hardly be considered residential,—is that of a farm of 150 acres, situate between Farnham and Aldershot, about twenty acres of which is hop land, the rest arable fir plantations and some heath land, lately sold for 8,000*l*., or 55*l*. an acre; so there is some value in land still.

Several Bills during last Session were introduced into Parliament, dealing with property in land in a manner requiring our gravest attention. There was a Bill ordered to be printed in February of 1884, to amend the Copyhold Acts, and to promote the enfranchisement of lands of copyhold and customary tenure, and of lands subject to customary and other incidents of rights, the first clause of which provides that the lord, admitting or enrolling a tenant after the last day of the year, is to give notice of enfranchisement, and in default of doing so the land not to be subject to fines, &c. Now, this, on the face of it, seems a very arbitrary proceeding, and it is easy to see that it might operate injuriously both to the lord and the copyholder; and, notwithstanding other useful provisions in the Bill, still its arbitrary character is a very prominent feature.

There was another Bill for the enfranchisement of leasehold building land ordered to be printed in April of this year. This Bill was very short; but I can hardly think it could have been well considered, and it is indeed surprising how any gentleman returned to the House of Commons as a fit and competent representative of his constituents could propound such an unreasonable scheme. What happened with it in the House I do not know; but the Bill provides that any person holding an agreement for a building lease may, at any period during the continuance of the lease, have the power to purchase the fee-simple of the land comprised in the lease, by giving six months' notice of his intention to do so; and that he shall acquire the freehold by payment of an amount equal to twenty-five years' purchase of the annual ground-rent reserved by the lease. To illustrate the utter unreasonableness of such a proposition, take the case of a lease of which, say, there are only a few years to run. It is no unusual thing that a house may be worth, say, 300*l*., and be held at a ground-rent of 50*l*., or even less. Assume there are five years of the term unexpired. Then, by payment of 50*l*. × 25 y. p. the lessee would acquire a freehold house for 1,250*l*., which five years afterwards would be worth 6,000*l*. Such a proposition is altogether too unreasonable. And observe that, although I am assuming the lessee to give his notice so long as five years before the term expires, if the lessee can do better than invest his money to pay 4 per cent., which is what he does when he redeems at twenty-five years' purchase, his interest is to defer the enfranchisement until within six months of the expiration of his lease; in which case the difference between the actual value of the freehold and the sum at which the lessee can enfranchise becomes more striking still.

Perhaps, however, the most important Bill as affecting the value of land in the metropolis is Mr. Broadhurst's Bill, ordered to be printed in October of last year, entitled "A Bill to enable Leaseholders of Houses and Cottages to Purchase the Fee Simple of their Property." The provisions of this Bill having been already very fully considered and discussed in this room, it is unnecessary for me to dilate fully upon them; but seeing the very large support this, in my judgment, dangerous Bill received in the House of Commons, it shows how large a sympathy there exists with the provisions this Bill sought to enact, and we may anticipate further propositions of a similar character will come under the consideration of Parliament. It has been alluded to constantly in the addresses of candidates for seats. I have not, however, observed any cogent arguments in its favour.

There is another point of view where the leasing system financially produces the best results, and without which many, perhaps most, of the palatial blocks of buildings known as City offices could not have been carried out, nor could the numerous limited liability companies who are the owners, and for the most part the prosperous owners, of these useful and important buildings, have been enabled to erect them. These offices, to a great extent, are leaseholds. The lessee takes the ground: he obtains a year's peppercorn to enable him to erect the buildings,—up to that point he has no capital to find,—the freeholder, who is content with 3 or 4 per cent., has found the capital for buying the land. As soon as the buildings are sufficiently advanced to entitle the lessee to a lease, he can raise a large portion of the money he requires, and if the buildings, when completed, are well let, he may raise, in some cases, all he has actually spent on them. If his speculation has been a moderately successful one, he may make 8 or 10 per cent. on his actual outlay.

Let us assume the case of a building which costs £10,000, and this is only a moderate-sized building:—

	£. s. d.	£. s. d.
Take ten per cent. on the outlay as the net rent, that is, per annum		1,000 0 0
Deducting the ground-rent, which we will assume to be a third of the rental value, or say	266 0 0	
Four per cent. interest on borrowed capital of 10,000*l*.	400 0 0	
		666 0 0
Leaves a net profit of		£334 0 0

This is perhaps an exceptionally favourable case, but it is sufficient to illustrate the advantages of the system. The freeholder has got his ground-rent well secured, besides a reversion which grows more valuable every year. The mortgagor places his money at a good rate of interest. The lessee, having to find only temporarily a small portion of the capital required for covering the land, earns a profit which would be considerably reduced if he had to find the whole, which he probably never could have done; whereas, with a comparatively small capital to enable him to start the building, he is enabled to make such a transaction profitable.

So I hold the leasing system to be an advantageous system, at least in London.

There is, however, no doubt, a feeling that it is unjust that a lessee who on ground which at the time it was leased was of small value, and on which he had made a large outlay, and whose interest therefore very greatly exceeds the original interest of the lessor in his land, should at any time be deprived of a property which his energy and capital had so largely increased in value. This is a deep-rooted feeling, and may not be unworthy of consideration; but certainly Mr. Broadhurst's Bill is far, to my mind, from solving the question with any approach to equity.

In conclusion, Mr. I'Anson dealt with the land question generally.

The Proposed Hudson River Tunnel.—No less than 1,500,000 dols. have already been expended on the partial construction of the proposed tunnel under the Hudson River, and the sum necesary for its completion is estimated at 2,200,000 dols. The total cost of the work will thus be seen to amount to 3,700,000 dols., or 925,000*l*. At the commencement of the undertaking upwards of 300 workmen were employed, and everything went well, until the latter end of 1882, when, unfortunately, owing to the death of President T. W. Park, work was suspended, all the *employés*, with a few exceptions, being dismissed. About the middle of July, 1883, the remaining workmen were discharged, and since that time nothing has been done towards the completion of the project. At the north end of the tunnel, on the Jersey side, 1,547 ft. have been finished, whilst on the New York side, 150 ft. of the north and 23 ft. of the south have been excavated. There are still 3,913 ft. in the north and 5,012 ft. in the south tunnels to be completed. It is calculated that it will occupy no less than three years and a half to accomplish the work.

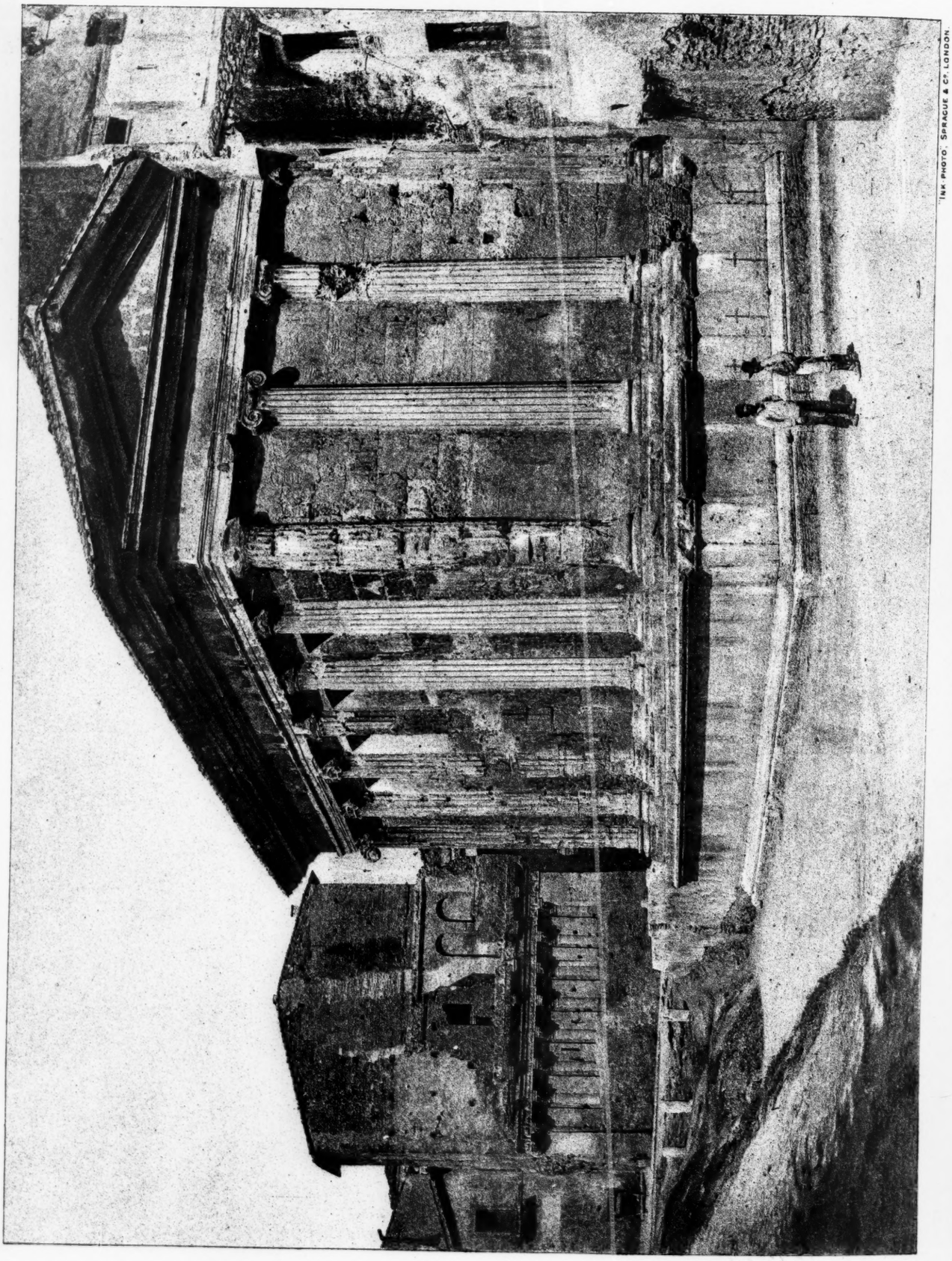
Rossini del. e inc.

C. F. Kell Photo-Lith & Printer

INTERIOR VIEW OF THE PORTICO OF THE PANTHEON A

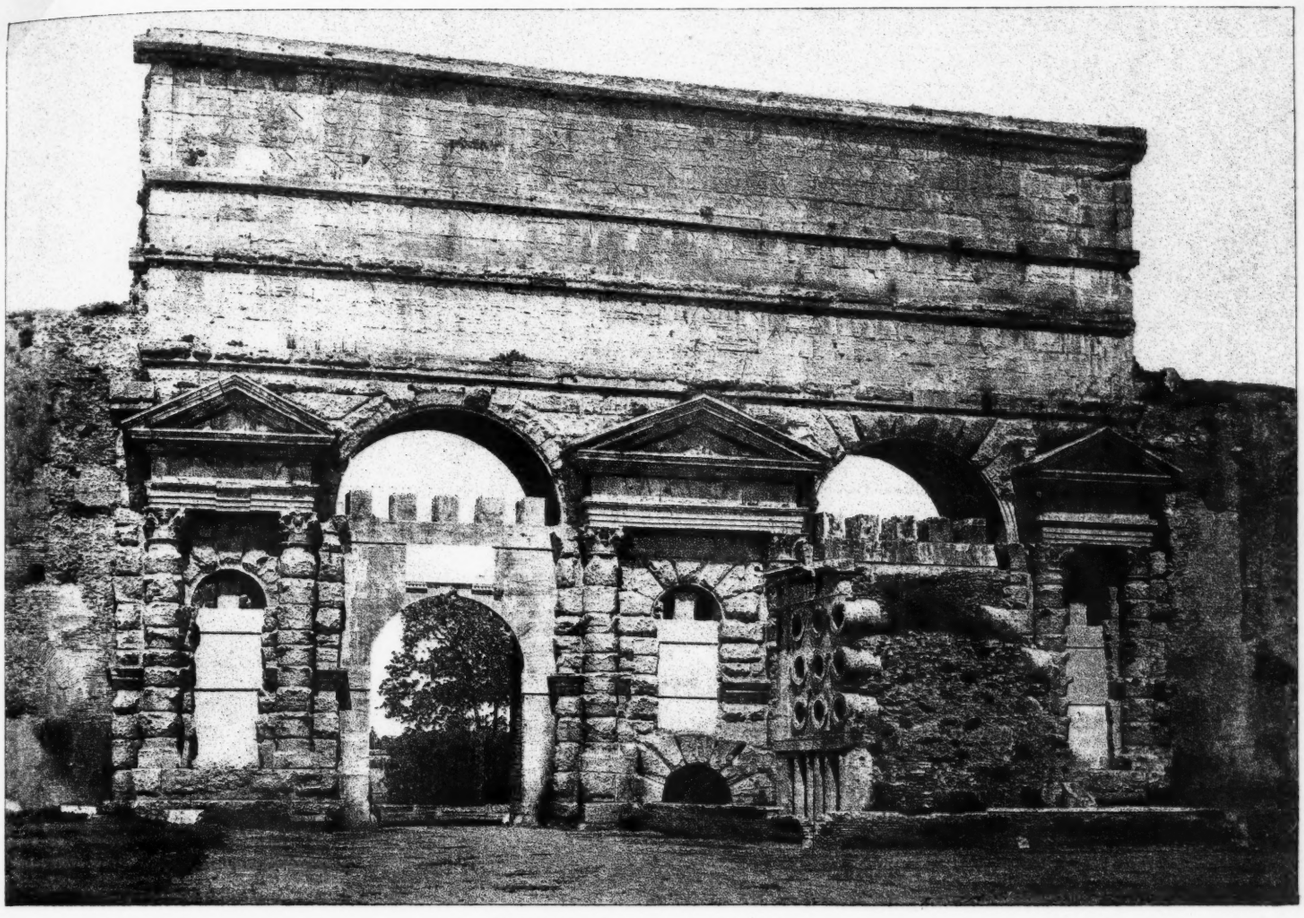
ION AT ROME. REPRODUCED FROM AN ENGRAVING BY ROSSINI

8, Castle St. Holborn, London, E.C.

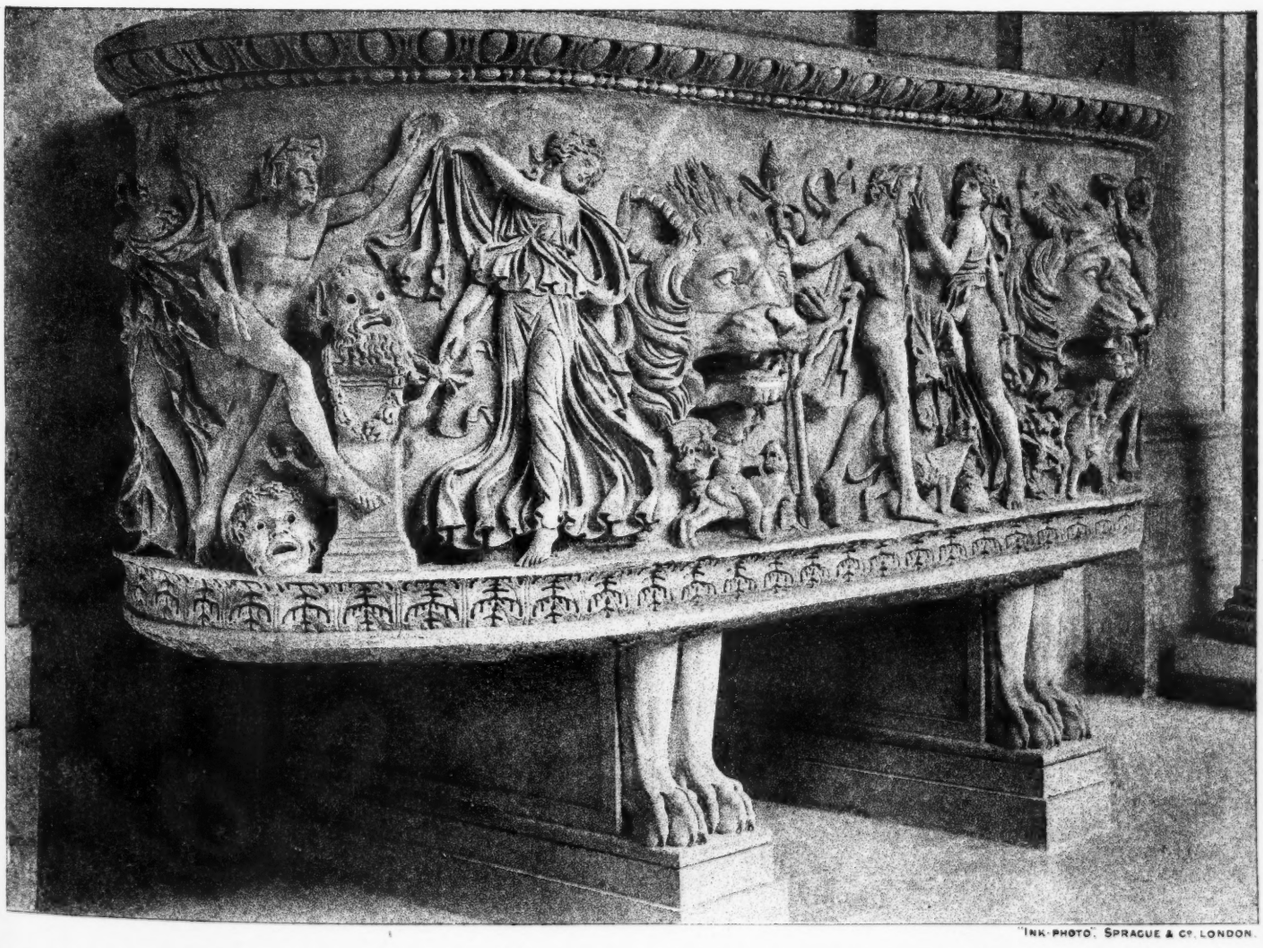


INK PHOTO. SPRAGUE & Cº. LONDON.

TEMPLE OF FORTUNA VIRILIS, ROME.



PORTA MAGGIORE, ROME.



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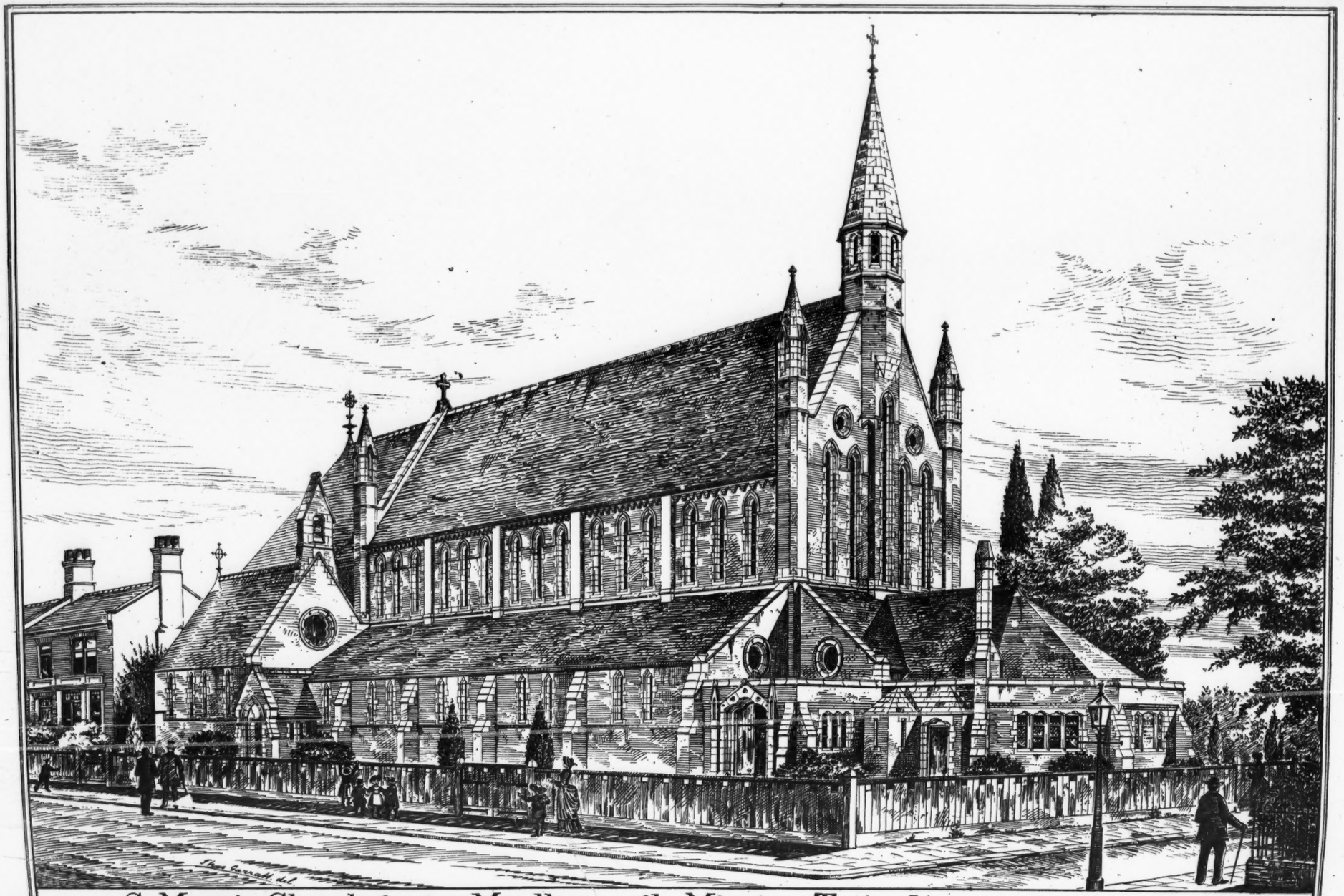
SARCOPHAGUS IN THE VATICAN MUSEUM.

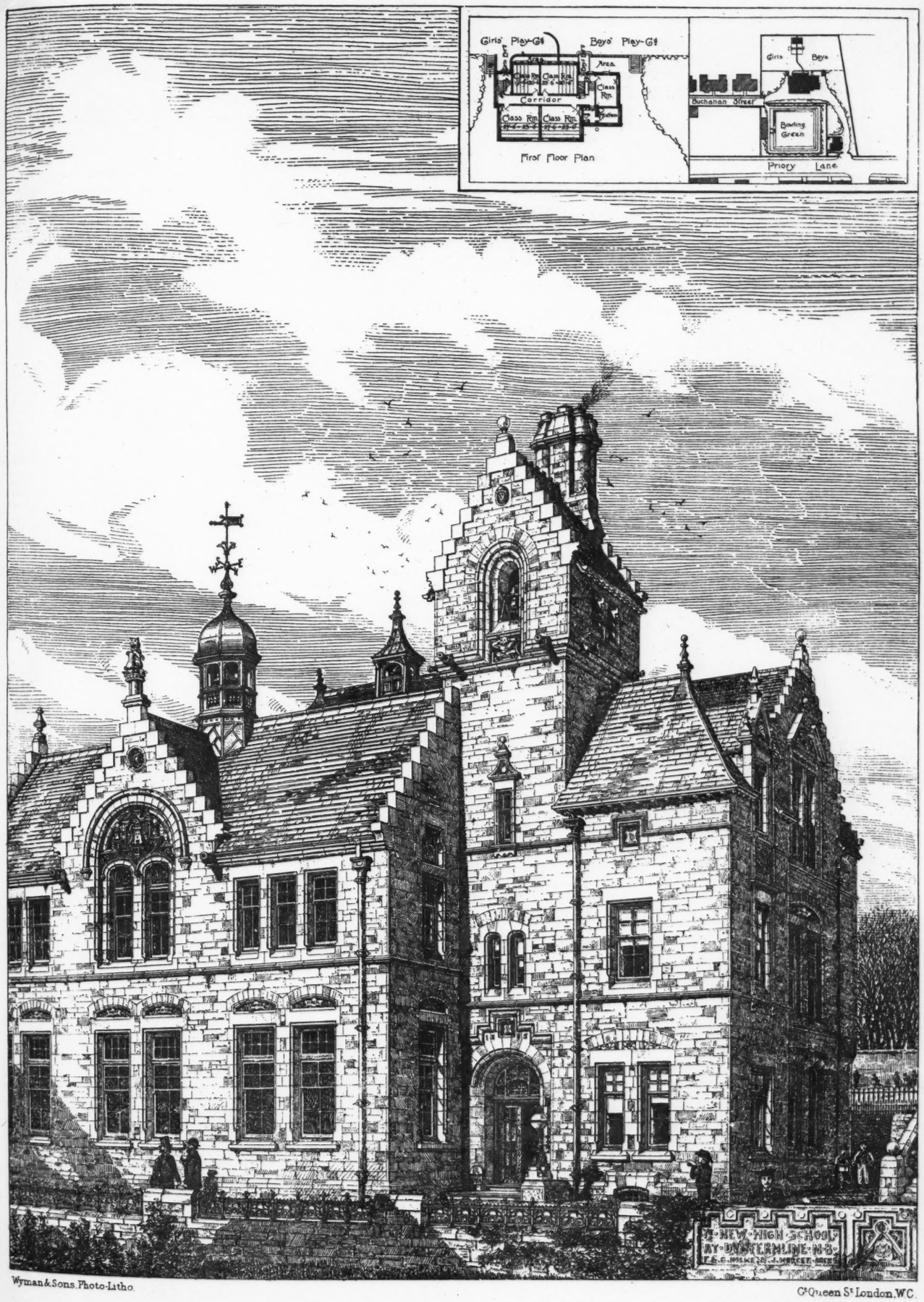


S·Mary's·Church·for·the·Marlborough·Mission·Tottenham

J.EDWARD.K.CUTTS. ARCHT.

Wyman & Sons. Photo-Litho.

C^o Queen S^t London. W.C



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Gt Queen St London WC

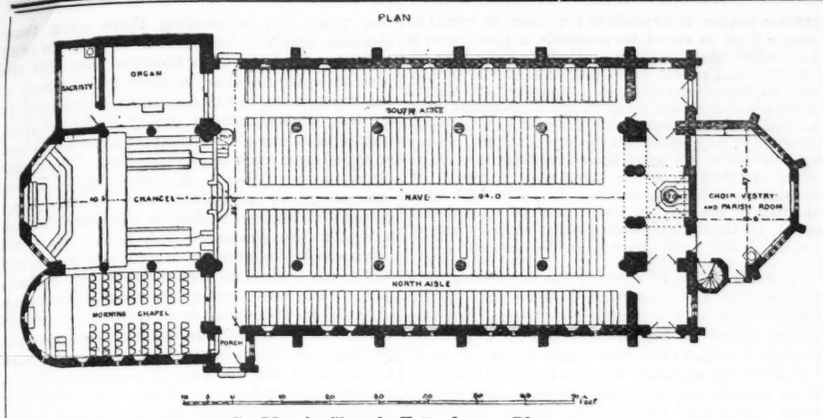
THE NEW HIGH SCHOOL, DUNFERMLINE.—MESSRS. HOLME & MERCER, ARCHITECTS.

BUSINESS PREMISES, LEWISHAM HIGH ROAD.—Messrs. Romaine-Walker & Tanner, Architects.

"INK-PHOTO." SPRAGUE & Co. LONDON.

BUSINESS PREMISES AND ENTRANCE TO WAREHOUSE YARD, CALEDONIAN ROAD, KING'S CROSS.

MESSRS. ROMAINE-WALKER & TANNER, ARCHITECTS.



St. Mary's Church, Tottenham.—Plan.

Illustrations.

ILLUSTRATIONS OF ROMAN REMAINS.

WE give two or three plates this week of prominent remains in Rome as a kind of commentary on Mr. Blashill's paper on Italy, printed in this number.

THE INTERIOR OF THE PORTICO OF THE PANTHEON.

has an interest apart from the purely architectural one, as it is a reproduction by photo-lithography from one of a fine and now rather scarce set of old engravings of Roman subjects by Rossini. The one reproduced is from a series belonging to Mr. Jas. Burchell. The point of view, in the interior of the portico, is also unusual; there are plenty of engravings and views of the Pantheon in existence, geometrical measured drawings and perspective drawings; but we do not remember elsewhere to have come across a view taken in the interior of the portico. The Pantheon has been currently accepted as having been originally the great entrance-hall to the Baths of Agrippa, which are immediately in the rear of it. One of the most recent students of Roman subjects, Mr. J. T. Middleton, in his just published work on "Rome in 1885," combats this view, and asserts that the Pantheon was never in actual connexion with the Baths. As we shall notice Mr. Middleton's interesting work at length shortly, we reserve the further consideration of the point till then.

TEMPLE OF FORTUNA VIRILIS.

This small temple, of which the name is probably an accidental corruption, and which was, probably, dedicated to "Fortuna" singly, without any "Virilis," is an example of one of the earlier classic buildings of the Romans, while they still were more influenced by Greek refinement and precedent than in their later structures. It may date from a century B.C., and stands in the Forum Boarium, near the Tiber and at the foot of the Palatine Hill. It is of an Ionic order, much more pure and refined in style than Roman work generally.

PORTA MAGGIORE.

The external view of the Porta Maggiore is the finest and most interesting amongst the gates of Rome. The inscriptions show that this was part of the two aqueducts through which flowed the *aqua Claudia* and the *Anio Novus* constructed by the Emperor Claudius A.D. 52, and repaired by Vespasian in 71 and by Titus in 80. When Aurelian built the wall round the city he made use of this as one of the gates. An older object,—the Monument of the baker Eurysaces,—built towards the end of the Republic, stands outside the gate, and was until modern times inclosed in a fortification built by Honorius. Its design is founded on the idea of a baker's oven, and stone mortars or kneeding troughs, with other illustrations of baking, are conspicuous in the monument. The inscription is "EST HOC MONIMENTVM MARCEI VERGILEI EVRYSACES PISTORIS REDEMTORIS APPARET," three times repeated.

SARCOPHAGUS.

The Sarcophagus shown in the plate is a large one in white marble, adorned with figures sculptured in basso and alto relievo of dancing Satyrs and Bacchantes. It has long formed one of the principal objects in the collection shown in the Cortile of the Belvedere at the Vatican.

ST. MARY'S CHURCH, TOTTENHAM.

THIS church is to be built in the Lansdown-road, near the Bruce-grove Railway Station. The foundation-stone is to be laid next Easter by the Duchess of Albany. The church is being mainly built through the efforts of past and present boys of Marlborough College, by whom the mission is supported. The building will be faced internally and externally with red brick, with dressings of Bath stone. The morning chapel is provided with a separate entrance, bell, heating, and gas, so that it can be used entirely apart from the church by drawing curtains across the arches that open into it from the chancel. The building is planned to seat 720 persons, and is to be erected at a cost of 5,500*l.* exclusive of the commission of the architect (Mr. J. E. K. Cutts) and the salary of the clerk of works.

BUSINESS PREMISES, LEWISHAM HIGH ROAD.

THESE business premises were completed and opened in August of this year as a builders, and furnishing ironmonger's, by Mr. G. E. Haycraft, of the old-established firm of Messrs. Haycraft & Son, the Broadway, Deptford.

The site is commanding, having frontages 80 ft. in extent, faced with red Fareham bricks and Box-ground Bath stone. The basement, ground and first floors, are all open, without dividing walls, the floors being carried by iron columns and girders, executed by Messrs. Dennett & Ingle. The top floor is arranged *en suite* for a residence for the manager, and is approached by the private door on the left. It is fitted up with all necessary rooms, bath, kitchen, &c., and is planned to give him access to the various trade departments. A handsome teak staircase in the centre of the ground-floor affords easy communication to both the show-room on the first floor, and the builder's ironmongery department in the basement.

The fittings of the principal trade floors are carried out in character with the rest of the work. The building contractor was Mr. Mark Redman. Mr. V. Hibbins was clerk of the works; the architects were Messrs. Romaine-Walker & Tanner, of 19, Buckingham-street, Adelphi, W.C.

Both the illustrations are from water-colour drawings by Mr. Romaine-Walker.

BUSINESS PREMISES, CALEDONIAN-ROAD, KING'S-CROSS.

THE illustration, which was exhibited in last year's Royal Academy, shows the front of a large block of offices recently erected for Messrs. Wilkinson, Heywood, & Clark, the well-known colour and varnish manufacturers.

The property is 11,000 square feet in extent, and in addition to the offices there are extensive warehouses in the rear grouped round a central yard. The apartments for the principals are on the first floor, while on the ground-floor there is a large suite of offices for manager, shorthand clerks, and general clerks; and an order corridor communicating with the various departments by sliding glass panels. In the basement are fireproof rooms and lavatories.

The large warehouses approached by the gateway shown in the drawing are four floors in height. The basement for storage of heavy goods is provided with a lift by Messrs. R. Waygood & Co. On the ground-floor there is a mill-room, engine-room, and varnish-room, though most of the manufacturing is carried on at the premises at West Drayton. The two upper floors are devoted to storage of goods. The centre yard, which is covered by a glass and iron roof constructed by Messrs. W. H. Lindsay & Co., is used for loading and unloading by means of steam cranes, and for packing goods for export. The various departments are divided with fireproof doors.

The road front is of red Fareham bricks and hung Broseley tiles. All the wrought metal work was made by Mr. J. Barford, of Maidenhead. The interior walls of offices are panelled and fitted with pitch pine. The new warehouses are fireproofed throughout by Messrs. Dennett & Ingle. The general contractors have been Mr. George Phillips and Messrs. G. S. S. Williams & Son. The architects for the entire works have been Messrs. Romaine-Walker & Tanner, of 19, Buckingham-street, Adelphi.

On the right of the above premises is shown part of the front of the King's-cross Turkish Baths. The interior has lately been greatly extended and improved. The size of the tepidarium has been doubled, and the whole bath paved and seated with marble. An additional frigidarium has been built on an octagonal plan, lighted by a cupola. The walls of this apartment are panelled with choice foregn marbles. These works have been carried out from the designs of the same architects.

DUNFERMLINE NEW HIGH SCHOOL.

THIS building has been erected from a design selected in competition, as mentioned in the *Builder* for Dec. 8, 1883. The style adopted by the architects is Scotch Baronial adapted to modern requirements, a lofty bell-tower being the crowning feature. The principal masters' and strangers' entrance is to the south-east, under the tower, with separate entrances for boys and girls to the west and north respectively, and half-way entrances from high play-grounds. The schools, by reference to the block plan, show approaches from Buchanan-street and Priory-lane, with ornamental railings and gates. The janitor's house is placed to the south, commanding main south entrance. The higher play-ground is reached by flights of steps on either side.

The external walls throughout are built 2 ft. thick with cavity, and lined inside with brick-work, outside faced with bull-headed rubble in courses. The dressings generally are in brown Bannockburn stone, the remainder of the structure being local stone and a white colour. The school-rooms have a dado 4 ft. high of salt-glazed bricks, and the lavatories are lined throughout in this material. The walls are plastered from the dado, and the ground-floor is laid with wood blocks. The roofs are slated with Balachulish full-sized slates; the tower being Elterwater (Westmoreland) green slates, and finished with red Ruabon ridge tiles. The accommodation provided consists, on the ground-floor, of three class-rooms, with scholars' lavatories, rector's room and lavatory, waiting-room, vestibule porch, boys' and girls' stairs, and wide central corridor. The mezzanine contains two separate lavatories for scholars. On the first floor there are six class-rooms, mistress's room, and lavatory. The top floor contains drawing-room, storage for materials, laboratory, and apparatus-room. The accommodation provided is for 500 scholars. The cost will exceed 6,000*l.*, which includes a janitor's house, containing living-room, scullery, pantries (scholars' dining-room used by country scholars adjoining), with three bedrooms over. This house is built and finished to correspond with the school. The contractors for the various works were:—Mr. George Dick, for mason's work; Messrs. Mitchell & Kinghorn, for joiner's work; Mr. A. Rolland, for plumber's and gasfitter's work; Messrs. McOuan & Lambert, for slater's work; Messrs. A. & R. McGregor, for plasterer's work; Messrs. Bennett & Son, for ironwork; Mr. A. Lowe, for glazier's work,—all of Dunfermline; Messrs. Stuart & Co., Edinburgh, for granolithic work; Messrs. Robinson & Son, Edinburgh, for heating work; Mr. Roger Lowe, Farnworth, for wood block flooring work; Mr. Hooper, Glasgow, for ornamental glass work; Mr. Stevens, Leeds, for ventilation extractors; Mr. H. Thompson, Birkenhead, for gasfittings; Mr. Jas. Roy, Liverpool, for grates and stoves; and Messrs.

Bonnar & Sons, Dunfermline, for ornamental ironwork, railings, gates, &c. The carving was done by Mr. W. Neilson, Edinburgh. The clerk of works was Mr. W. Swinton, Dunfermline; and the measurer was Mr. A. Lawrie, George-street, Edinburgh. Messrs. F. & G. Holme and Mr. S. A. Mercer (Liverpool) are the joint architects.

ARCHITECTURAL ASSOCIATION.

THE second meeting of the present session of this Association was held on Friday, the 5th inst., at Conduit-street, Mr. C. R. Pink (President), in the chair.

The following new members were elected:—Messrs. H. Passmore, E. F. Seaman, W. H. White, H. E. Mathews, A. W. Cooksey, F. Edwards, H. F. Ford, H. R. Appelbee, L. C. Mountstephen, F. Quick, B. Fox, J. Harper, J. M. Harper, D. A. Ross, J. C. Heriot, R. G. Booth, W. H. Howie, F. M. Simpson, R. G. Sevenoaks, E. J. Sadgove, E. Stapleton, S. E. Davies, T. Chettlebrugh, S. J. Ladds, G. W. Sadler, jun., B. T. Wynne, and J. C. Browne.

It was announced that the Committee had decided to offer a prize of three guineas to the Advanced Class of Construction, for the best *précis* of two meetings, each competitor having attended four. It was further announced that the Committee have awarded the "Sketch-Book" prize to Mr. G. G. Woodward, Mr. C. E. Luke being second.

The Librarian announced several donations of books, and stated that the Library would be open from seven to eight on those Wednesdays on which classes were held, as well as on Fridays, at the usual time.

Reference was made to the death of Mr. A. T. Ellison, an active member of the Association, and a vote of condolence was directed to be sent to his widow.

Mr. Thomas Blashill then read his paper, entitled "Italy: For Students." This we print on another page. Mr. Blashill prefaced his paper by reading extracts from letters he had received from Mr. G. Aitchison, A.R.A., and Professor T. Roger Smith.

Mr. Aitchison, after expressing his inability to be present, wrote:—

"I think few things more important to architectural students, when they have finished their course of study, than travel in Italy; and if the cost is what it was thirty years ago, I may say that I travelled through France and Italy, and lived there for two and a half years, on an outlay of 130*l.* per annum, visiting Havre, Paris, Lyons, Avignon, Marseilles, Genoa, Pisa, Rome, Naples, Pompeii, Amalfi, Salerno, Pæstum, Perugia, Assisi, Florence, Lucca, Pistoja, Milan, Verona, Venice, Padua, Ferrara, Ravenna, and Bologna. To see the inside of the Pantheon at Rome will, in my opinion, be a sufficient reward for a visit there; but there is another object to be gained in seeing the enduring character of Roman work, contrasting, as it does, with our own flimsy construction. Throughout Italy, but more especially in the north, we see work of the Early Renaissance, which, as a rule, can be seen nowhere else, and these works are characterised by such perfection of proportion, elegant simplicity of outline, and perfection of detail, that it is an education in itself. And in these buildings and monuments the most original and delicate sculpture is to be found, only to be surpassed by that of ancient Greece. These buildings and monuments show us, too, the very slight way in which we study, as compared with the early masters of the Renaissance, who were first goldsmiths, then painters, then sculptors, and who rose eventually to be architects, not merely giving designs, but in many cases working out the whole monument, sculpture and all, with their own hands. Besides the size and grandeur of Italian buildings, we see there the perfection of architecture, *i.e.*, when combined with colour, with painting, and with sculpture. In St. Mark's at Venice we have the finest example of what a Christian cathedral should be: the construction looks stable. You never ask yourself why it does not fall on your heads, as in a vaulted Gothic cathedral. The whole effect is grand and dignified, the main lights coming in broad floods from a few openings, not irritating the eyes by a constant succession of windows. The walls are covered with marbles, the veins of which are laid so as to produce a diaper, and the vaults and domes are resplendent with coloured mosaic on a gold ground. The pavement, too, being mainly of mosaic in small patterns, does not dwarf the edifice."

Professor T. Roger Smith wrote expressing regret at being unable to be present, and added:—

"I cordially concur in the aim of your paper. I am sure that some acquaintance with Italy is of the greatest possible value to any and every student of architecture, and as there are many whose circumstances render it impossible for them to spend as long a time as would be desirable, a short visit is far better than nothing. Had I been able to be present, I should have, perhaps, said a word or two on the desirability of preparing beforehand. A man is able to see many things if he knows what to look for, which escape his notice if he goes uninstructed; and your friends at Conduit-street, if they are to make the most of every hour in a short visit, can only do so by being well prepared, by consulting books of reference, &c., that bear upon the part of the country which they go to, and that speak of the history and quality of the works of art which will come under their observation."

The Chairman, in opening the discussion, said he was glad that the lecturer had not confounded a short visit with a lengthened tour. The two things stood on an entirely different footing, though a short visit was likely to be of great benefit to the student. They in England obtained their knowledge of Italian architecture chiefly from books and illustrations, which could not fail to appeal more strongly to them if they once saw the buildings themselves. They would also be able to form an idea of the skill of the great Renaissance architects. It was necessary to devote some time to preliminary study, and if they did so much benefit would be derived from a short stay in Rome. With regard to the proposed class, if the committee could see any way to further it they would be pleased to do so. It seemed scarcely a question for a class, but rather for a sub-committee of members acquainted with travelling in Italy to formulate some scheme. Mr. Blashill had referred to the beautiful work at Bologna, and this would be brought before them later in the session by Mr. William White.

Mr. H. L. Florence bore testimony to the practical manner in which Mr. Blashill had treated the subject, and hoped that his advice would not be neglected by the members. Italy was the one country in which was found the union of the arts in connexion with architecture. In no other land was one able to see such examples of sculpture, in stately architectural forms, combined with mosaic, and generally with every species of the arts which could be worked together. Thus, architecture could be studied in its manifold combinations with the other arts, and be understood in its true perfection. Another distinguishing point in Italian travel was that one could choose a tour according to the time of year. The lines of railway again seemed almost contrived to assist the student, and, even in the heat of summer, the hill-cities of Italy would supply sufficient occupation. He would be rather inclined to recommend a series of short journeys than to attempt long distances. He concluded by proposing a vote of thanks to Mr. Blashill.

Mr. J. A. Gotch seconded the vote. If one could spare the time, there was no better place to go than to Italy. The country was, indeed, like a great museum, and therefore some wise plan of study was necessary beforehand.

Mr. Leonard Stokes said he had spent three months in Italy, and was afraid that a three weeks' tour would be too short. His expenses for the three months were only 50*l.* Those who went to Italy should endeavour to master the language, which was especially useful in finding out information about the various buildings. Several of the most important works were Government property, and it was necessary to obtain permission to sketch them. The Italian Government, however, treated students well, and in the case of Pompeii, supplied a pass which enabled the student to enter when he liked without being troubled with the attentions of a guide. Mr. Blashill had suggested that a party should go, but this had its advantages and disadvantages. In the case of a party one usually assumed the lead, and took the others about.

Mr. S. F. Clarkson said he understood that Mr. Blashill was not proposing a mere holiday, but a piece of really hard work, which nobody should undertake without careful preparation. The traveller would have to go as an architectural student, because if he went as an ordinary being he would be unable to get through the amount of work proposed.

Mr. Lovegrove said that some years ago, fired by reading Ruskin, he took a great interest in the works of Italy. He believed that a Standing Committee in connexion with Italy would be of advantage, as the study of its buildings would materially assist those who meant to present themselves for the Architectural Examination.

Mr. H. W. Pratt said he had visited Italy a few years ago, sojourning there about three months, and the impression left on his mind was a general one. He took the tour with the idea of again devoting a short time to each of the cities, studying them more minutely and in detail. This afforded a sort of bird's-eye view, and enabled one to choose those parts which best supplied the style and character of work desired to be studied. A knowledge of Italian was of great advantage, and he was lucky enough at Verona to fall in with Mr. Stannus, who put him through his A B C. He would advise all students to avoid the hotels and *cafés* where English and French were spoken; and if that were done one could live much more cheaply in Italy than in France. With regard to the climate, he was unfortunate enough to be there in the winter time, when the snow lay deep on the ground. The amount of decoration and colour in Italy was something wonderful, and caused an enthusiastic feeling for the style of work. As to mosaic, there had been a great advance in this work within the last few years, while tiled pavements were to a great extent disappearing. At the same time the old Italian mosaic was very different from the modern stuff. Everything depended upon carrying out the modern work on the same basis as the old; the size of the stones, the joints, and the way they were laid, making all the difference between the modern and ancient ideas. In no country could beautiful photographs be purchased so cheaply as in Italy. Any party should be limited in number, as it was best to study by one's self, or in twos and threes. He could see no reason why a small party from the Association should not visit Italy every year.

Mr. F. J. Hooper remarked that the expense of living in Italy was not great, and that if by this means the architect could extend his knowledge, it was money well laid out.

The Chairman congratulated the meeting upon the discussion which the paper had elicited. He was glad that the suggestion of a Committee had been rather warmly taken up. A Sub-Committee on Travel might be fraught with good to the Association.

The vote of thanks was then put, and was cordially received.

Mr. Blashill replied, and said that Mr. Clarkson had recognised the fact that they were made up of two parts,—part architect and part human being. It was as the architect, carried about by the human being, that he considered the student should visit Italy. The man he had in his mind's eye was the one who could spare only a short time, going to bed betimes and rising early, and thus getting through an immense amount of work. As to the hotels, Mr. Phené Spiers had supplied him with a lot of memoranda. With regard to the language, he learned his Italian alphabet, and as many phrases as he could get hold of. Guides were "dark horses," and might turn out useful or not. In some places, however, guides were compulsory. Mr. Appleton, the Hon. Secretary, informed him that he would be delighted to receive the names of members who might be able to go to Italy. Books on the country were very unsatisfactory, and it would be well if they could draft some architectural handbook. If architects did not visit Italy, they would find that their clients and friends went, and that they would be the only people who did not go thither.

The meeting then separated.

Society of Arts.—The hundred and thirty-second session of the Society of Arts will commence on Wednesday, the 18th inst., when the opening address will be delivered by Sir Frederick Abel, C.B., D.C.L., LL.D., F.R.S., chairman of the Council. Among the papers to be read the following may be mentioned as likely to interest our readers:—Prof. Silvanus P. Thompson, "Apparatus for the Automatic Extinction of Fires"; F. Edward Hulme, F.L.S., F.S.A., "Technical Art Teaching"; Dr. C. Meymott Tidy, "The Treatment of Sewage"; W. H. Preece, F.R.S., "Domestic Electric Lighting"; Prof. R. Meldola, F.C.S., "The Scientific Development of the Coal-Tar Industry." Six courses of Cantor Lectures have been arranged. Among the six courses of Cantor Lectures arranged are "Friction," by Professor H. S. Hele Shaw; "Science Teaching," by Professor F. Guthrie, F.R.S.; and "The Arts of Tapestry Making and Embroidery," by Alan S. Cole. Dates and further particulars will be announced in the Society of Arts *Journal*.

BUILDERS' BENEVOLENT INSTITUTION.

ANNUAL DINNER.

The thirty-eighth anniversary dinner in aid of the funds of this Institution was held (as briefly announced in our last, p. 663) on the 5th inst., at Carpenters' Hall, London Wall. Mr. Arthur C. Lucas, J.P., the President, occupied the chair, and was supported by Lord Crewe, Mr. John Aird, Mr. F. J. Dove, Mr. Stanley G. Bird, Mr. H. J. Kennard (Warden of the Carpenters' Company), Mr. George Plucknett, J.P., and other friends of the Institution.

The usual loyal and patriotic toasts were given by the Chairman; Major Brutton replying for the "Army and Navy," and Major Stanley G. Bird for the "Reserve Forces."

The Chairman, in proposing the toast of the evening,—"Success to the Builders' Benevolent Institution," said he felt some diffidence personally in making his appeal, being one of the youngest connected with the trade in the room. At the same time, no one had the welfare of the Institution more at heart than he had. Those who were fitted to give an opinion would admit that the building trade was liable to more than the common business risks and vicissitudes. It was, indeed, a most open business, subject to great fluctuations in wages and in the prices of materials, the risks of which the builder took. They had also to contend with strikes, and with such uncertain weather as they were now experiencing. Having thus pointed out a few of the risks which appertained to the builder's calling, he asked the company to consider for a moment the manner of man on whom these risks fell. He must be a man amongst men, with considerable knowledge of human nature; able to control those in his employ, and have a head for organisation, without which his efforts would be futile. It was a risky business, but he was proud to say that those who belonged to it were a body of men who bore the highest possible character. What, then, might not happen to any one connected with the business, especially in these bad times? And when they thought of that, let them extend a helping hand to those whom misfortune had overtaken. Turning from generalities, it gave him the greatest pleasure to speak of the organisation of the Institution, and he had been sufficiently long connected with it to know how admirably it was managed, and how much energy and self-sacrifice the Committee devoted to its interests. The Secretary (Major Brutton) and Hon. Treasurer were known to all, and eulogy was unnecessary. Notwithstanding the bad times, and the consequent falling off in subscriptions, a larger number of cases had been relieved last year than hitherto, and at the present moment, thanks to skilful management, and a knowledge of the merits of the applicants, all approved cases had been attended to. This was very satisfactory, but other applications were coming in. He ventured, therefore, to ask them to give practical effect, by their contributions, to the cordiality and good-will with which they would doubtless receive the toast.

The Chairman next gave "The Health of the Carpenters' Company," and thanked them for the use of their fine hall. When it became known where the dinner was to be held, the application for tickets was so great that the secretary had to consider the question of accommodation. The Carpenters' Company had further shown their goodwill by voting a donation of 100 guineas, and promising an annual subscription of twenty-five guineas. He coupled with the toast the name of Mr. H. J. Kennard, one of the Wardens.

Mr. Kennard replied, adding that though the Company was not a rich one, they were trying to use its revenues for the advantage of the citizens and the trusts committed to their care. It was the desire of the Court that a large portion of the revenues of the Company should be devoted to the advantage of the building trade of London. Lectures on carpentry and building had been organised, and they would be glad to confer with the leading builders as to how they could further advance the interests of the trade.

Mr. Kennard then proposed "The Chairman and President," whom he said he had known from a child. Mr. Lucas's father was a great supporter of the Institution, and it was satisfactory to find the sons taking the fathers' places in these good works.

The Chairman in responding said that he should always consider it a great privilege to assist an Institution connected so intimately with the trade.

Mr. Charles Lucas, jun., next gave "The Vice-Presidents and Trustees," coupling with the toast the name of Mr. F. J. Dove.

Mr. Dove replied, and added that the Trustees always invested the funds safely. The money at their disposal was placed in Consols, and he only wished they could so place it as to get another half per cent.

Mr. J. Aird proposed "The Treasurer" (Mr. George Plucknett, J.P.), for whose name, he said, both the donors and recipients had the greatest reverence and respect.

Mr. Plucknett, in replying, referred to the fact that the benefits of the charity extended to persons who had carried on business within a circuit of ten miles round the General Post-office. In this area there were thousands of persons engaged in the building trade, and yet only about 800 of them subscribed to the Institution. He hoped that by the kindness of the subscribers and donors they might be able to raise the stipend to the recipients; to elect all the candidates at the next meeting; and yet have a balance left in hand.

Mr. J. Howard Colls proposed "The Architects and Surveyors," coupled with the name of Mr. C. B. Arding, who briefly replied.

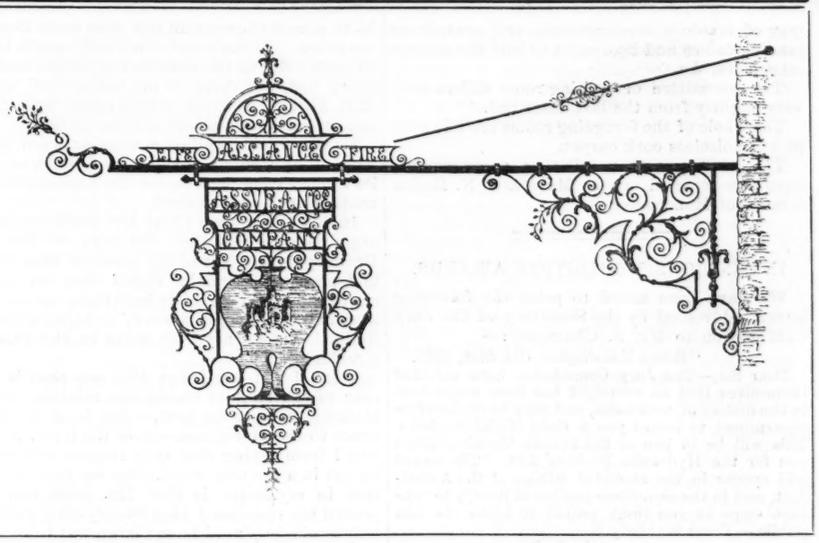
Mr. B. P. Ellis proposed the concluding toast, "The Committee and Stewards," to which Mr. T. G. Smith suitably responded.

In the course of the evening, subscriptions and donations amounting to 939*l.* were announced, the total sum being made up to 1,000*l.* by additions from the President, and Messrs. Kennard, Aird, and T. G. Smith.

Mr. Kennard also stated that the Carpenters' Company would be happy to give their hall for next year's dinner.

We are asked to mention that the Committee intend electing the three candidates now on the list on the 26th inst., therefore it will be unnecessary to issue polling papers. The names of the candidates who will be elected are John R. Bisley (who has been two years on the list of applicants), William Thornton (eighteen months on the list), and Mrs. Ebbs (her first application).

Crediton.—In response to the invitation of the committee appointed to take the preliminary steps for securing a continuous supply of water for Crediton, thirteen engineers sent in schemes. Out of these four sets were selected for examination and final decision, submitted respectively by Mr. Appleton, Torquay; Messrs. Nichols & Son, Birmingham; Mr. Martin, Exeter; and Mr. Cobbold, St. Alban's. The committee awarded the premium of 35*l.* to Mr. Appleton, his plan being the nearest approach to their view in providing a gravitation scheme, the general opinion being that the cost of pumping precluded schemes other than gravitation being adopted. The committee are now in communication with Mr. Appleton, and as a result hope by the end of the present month to place a feasible scheme of water supply before the Commissioners for their adoption, when the preliminary work of the committee will have been accomplished.



A WROUGHT-IRON SIGN.

The sign, of which we give an illustration, and which is affixed to Mr. Norman Shaw's fine building for the Alliance Assurance Company, at the corner of Pall-mall and St. James's-street, has been designed and executed by Mr. Alfred Newman, of Maddox-street, and is entirely hand-forged. The shield is perforated with the crest and motto of the Company. The centre shaft is run through the wall, and there are two ornamental stays which give a sense of security to the whole. The cost is somewhat over 100*l.*, and the work is one of the largest as well as one of the best specimens of modern wrought-iron work of this class.

The whole has been carried out under the superintendence of Mr. Cyril Flower, one of the directors of the Company. The sign, which projects boldly from the angle of the building, so as to be seen along Pall-mall and St. James's-street, forms a characteristic addition to one of the most picturesque of recent London buildings.

DARLINGTON PUBLIC LIBRARY.

This building, which has been designed by Mr. G. G. Hoskins, F.R.I.B.A., of Darlington, was opened to the public on the 23rd ult. by Lady Lymington, the only child of the deceased donor, the late Mr. Edward Pease. The style of architecture is Renaissance, the structural materials employed being red pressed bricks, with red stone dressings, and pitch-pine timber. The west elevation has a frontage to Crown-street of about 106 ft., and the north elevation (to East-street) of about 92 ft., the principal entrance being at the junction of these two elevations. In the tympanum of the porch is some heraldic carving representing the borough arms, with its motto, "Floreat Industria," and the arms of the Pease family, with its motto, "Pax et spes."

The public lobby, which gives direct access to the various rooms, is lighted from the ceiling by an octagonal ceiling light filled in with painted glass. Dividing the lobby from the lending library is a handsome screen also filled in with stained and painted glass, and in the tympanum of this screen is a group of figures representing the early industries of Darlington. The figures have been carried out from the architect's drawings by Mr. W. H. Atkinson, of Newcastle-on-Tyne.

The lending library is lighted from the roof, which is partly open-timbered; the librarian's desk being immediately in front of the entrance, and running south and east from this desk are the indicators for 24,000 volumes. The book-cases in this and other rooms, which are capable of holding 45,000 volumes, as well as the remainder of the furniture and fittings throughout the buildings, have all been specially designed by the architect.

In the general reading-room the ceiling is coved and divided into panels by moulded and enriched ribs. A pitch-pine dado 4 ft. high runs round the room. The newspaper stands, tables, &c., are all of polished pitch-pine.

The reference library is treated in a very similar manner.

The ladies' reading-room is for the exclusive use of ladies, with every convenience in the

way of lavatory arrangements, and containing reading-tables and bookcases to hold the various magazines, &c.

The committee or writing room differs only very slightly from the last described.

The whole of the foregoing rooms are laid with patent noiseless cork carpet.

The heating and ventilating arrangements have been carried out by Messrs. G. N. Haden & Sons, of Manchester.

INVENTIONS EXHIBITION AWARDS.

We have been asked to print the following letter, addressed by the Secretary of the Jury Commission to Mr. S. Chatwood:—

"South Kensington, Oct. 31st, 1885.

Dear Sir,—The Jury Commission have satisfied themselves that an oversight has been committed in the matter of your safes, and they have therefore determined to award you a Gold Medal for Safes. This will be in lieu of the Bronze Medal awarded you for the Hydraulic Bankers' Lift. The award will appear in the amended edition of the Award-List, and in the meantime you are at liberty to take such steps as you think proper to make the fact public.—Yours faithfully.

H. T. Wood,
Secretary to the Jury Commission.

Samuel Chatwood, esq."

CASE UNDER THE METROPOLITAN BUILDING ACT.

NEGLECT TO GIVE NOTICE TO DISTRICT SURVEYOR.

Mr. George Lansdown, District Surveyor of East Newington and part of St. George the Martyr, Southwark, summoned Mr. Thomas Brown, 113, New Kent-road, for neglect of giving notice under the 41st Section of the Metropolitan Building Act of certain works he had done to premises in Adam-street, New Kent-road, whereby he had rendered himself liable to a penalty not exceeding 20*l.*, to be recovered before a Justice of the Peace.

The case was heard at the Southwark Police-court on the 5th inst., before Mr. Bridge, who pointed out that the Legislature had considered it necessary in the Act to give power to inflict a heavy penalty for neglecting to give notice to District Surveyors before commencing works.

The District Surveyor proved that the defendant had rebuilt the front wall and part of chimney and back additions of a dwelling-house in rear of some premises in Adam-street, and that he had no notice from the builder of any work being done, the first intimation being that the roof had fallen in, throwing the new down, and injuring four men.

The Magistrate fined the defehdant 40s., and 2s. costs.

ON CIRCULAR HOSPITAL WARDS.

Sir,—I must apologise, both to Mr. Snell and yourself, for my delay in noticing his letter on p. 585.

With regard to the discussions (p. 549), allowing for the position of Mr. P. Gordon Smith, as president and chairman, I think he stated the case against Mr. Snell's conclusion pretty strongly.

His remarks on Professor Marshall's proposal of the circular system were published seven years ago.*

There are so many truths in the premises from which Mr. Snell deduces what, I consider, an entirely wrong conclusion, that I can well fancy the hearers of his paper being for the time carried away. Professor de Chaumont cautiously said:—"The arguments he has adduced seem to me at present very difficult to answer." Possibly a more critical examination of the printed paper might lead to more qualified approval on the part of his hearers.

Mr. Snell's last statement is quite new to me. He says:—"In the rectangular wards it was usual to get rid of the foul emanations of the patients by providing outlets into flues situated in the side walls, directly over the heads of the patients. Surely that was a better plan than carrying the deleterious matter across the ward, a distance of from 30 ft. to 35 ft. . . . ."

On referring to his book, I can find this method described in only one of thirty-six hospitals,—that of Strasburg,—but this system, or the one he uses at Marylebone and St. George's Infirmaries, outlets in the ceiling above the patients' heads, may be used just as well in the circular wards as in the rectangular ones. In fact, it is in use at Antwerp, though the outlets are there below the patients' heads. The deleterious matter need not be carried 30 ft. across the ward in one case more than in the other. In our hospital not only might there be such a flue in the outside wall at the head of every bed, but there is an inside wall about 22 ft. distant, in which others might be placed, and which is used to aid the ventilation.

In the outside wall of a circular ward there will not, as a rule, be even a smoke-flue, so that its whole extent is free for the construction of ventilating-flues if desired.

In his letter page (585) Mr. Snell inadvertently makes a mistake. He says:—"But Mr. Brown puts one part of the question most fairly and properly when he states that my paper shows clearly 'that thirty beds form the outside limit of a parallelogram ward,' and that a similar limitation of twenty beds holds in the case of circular wards."

What I did say (page 479) was that in the case of the circular wards, the relation of the circumference to the area,—that is, of the wall-space to the floor-space,—gave the limit. So far was I from saying that only twenty beds could be put in a circular ward, that the first contention in my letter is that Mr. Snell had not proved his statement that twenty-two patients only could be placed in the large wards because they were of circular shape. The object of my letter was to prove that Mr. Snell does not show this.

I further pointed out that thirty patients in these large circular wards would have the same floor-space and cubic space, with 74 ft. less walling than in the parallelogram ward; and that thirty-four patients would be better accommodated in the large circular ward than in the parish infirmaries. It was a great mistake for Mr. Snell to make, but I believe it was made quite inadvertently.

All will agree that in the case of either ward, the circle or the parallelogram, a very great saving in cost is effected by building wards with thirty beds rather than with twenty beds.

Miss Nightingale showed this twenty-two years ago. Yet, taking fourteen hospitals, given in Mr. Snell's book, that have been opened since 1876, and excepting two designed by Mr. Snell himself, we find one only,—St. Éloi, at Montpellier,—which has wards for more than twenty-four beds. Mr. Snell's paper (p. 443) is written to show that the additional outlay caused by the use of circular wards amounts to 105,000*l.* per thousand patients. Of this sum the larger half, 57,392*l.*, arises from the cost of nurses and maintenance for the additional wards required by placing twenty-two patients in the ward in place of thirty. Now a sum near this amount would be incurred by placing twenty patients in a ward in place of thirty in parallelogram wards, and has been incurred in eleven out of the fourteen hospitals I have quoted. This expense will have to be incurred so long as wards for twenty beds are preferred to those for thirty beds under either system of ward, and is, therefore, a question apart from the circular form altogether.

The other portion of the 105,000*l.*, namely, 47,743*l.*, is incurred through the fact that Mr. Snell provides an excessive floor and cubic space for the beds when he places them in the circular ward.

A patient requires about 4,000 cubic feet of air per hour, and this is best supplied by changing the air of the ward three or four times per hour,* thus a space of about 1,200 cubic feet in a well-constructed and well-ventilated ward is necessary. In calculating the minimum of cubic space the height of the ward above 12 ft. should not be counted.† The width of the ward should not be less than 24 ft.‡

Hence, in such a ward, to provide the minimum of cubic space, a bed-space of about 8 ft. becomes necessary. If the requisite amount of air, 4,000 cubic feet per hour per bed, can be supplied, this bed-space may be narrowed to that amount which is required for the lateral separation of patients and for convenience of attendance.

Mr. Snell's experience from his four large parish infirmaries, and from the Moabit Hospital, Berlin, as given in his paper, satisfies him that 6 ft. of bed-space is sufficient for this. Allowing this amount per bed, and subtracting 13 ft. for lobbies, Mr. Snell could put thirty-two beds in his circular ward, with over 100 ft. of floor-space and 1,400 ft. of cubic space per bed, provided he was able to give them the requisite amount of air, which a renewal of the air in the ward in a little under twenty minutes would ensure. If this were done, instead of the "sinful waste" of 105*l.* per bed, some saving would be effected, in comparison with the parallelogram ward for thirty beds.

Mr. Snell's large circular ward, arranged for twenty-two beds, is not one that would be suggested by any advocate of the circular system, and conclusions adopted from reasonings on it are worth little.

Prof. Marshall's ward, for twenty-two beds, is 4 ft. 6 in. less in diameter, contains 438 fewer square feet, and gives about 132 square feet per bed,—a by no means inordinate space,—and in this ward 16 ft. are reserved by Prof. Marshall for lobbies.

Mr. Snell's confidence that the Burnley Hospital will present the most striking example for illustration of the extravagance his paper so much condemns, is as ill-founded as his other conclusion.

Ours is one of those small hospitals to which, according to his note, this "sinful waste," or extravagance, does not refer. We wished to start with thirty beds, but in deference to Miss Nightingale's well-known opinions, enlarged our wards to twenty beds each.

Even if our size did not exclude us, it is absurd to take the cost of different hospitals as any test for comparison,—either total cost or cost per bed. The estimated cost in our case would be especially worthless, as we have gone on the principle of endeavouring to provide the very best hospital accommodation possible. We procured the services of Capt. Galton to aid us in selecting our plan, and are building a one-storied pavilion hospital, with an administrative block capable of serving double the number of beds (forty-four), with which we have started. We have a wash-house, laundry, subway for pipes, day-rooms, and promenades round them, 11 ft. wide, on the top of our wards, with access by a central staircase in the ward, and we are using glazed bricks for our walls, oak for our floors, and plate-glass for our windows.

Through the kindness of the architects, Messrs. W. Waddington & Son, of Burnley and Manchester, I have been able to send Mr. Snell tracings of the plans, and to submit here figures of the circular ward we are building, and of the rectangular ward for which it has been substituted, and which was on the plan selected by Capt. Galton:—

	Length of wall. ft.	Per Bed. Bed space. ft. in.	Floor space. ft.	Cubic space. ft.
Parallelogram, 80 ft. × 26 ft.	212	8 0	104	1,534
Circular Ward, 60 ft. diameter,	189	8 7	130	1,918

A trustworthy basis for comparison of cost, in the case of this circular ward now being built, and the rectangular ward we intended to build on the same site, is afforded by the calculations of the architect.

The cost of the central staircase and sun-room, special features of the one ward, are deducted, thus allowing of a fair comparison; the quantities have been carefully taken out, and priced from the actual bills relating to the contract.

The result is that the cost is about equal, the slight difference being in favour of the circular ward.

In this case it will be seen that the rectangular ward was 2 ft. less in width than the one Mr. Snell adopted.

I have drawn attention in this letter to the facts,—that in the circular ward, as in the rectangular one, the greater the number of patients in one ward the greater the economy; that in modern hospitals the wards are built for twenty rather than for thirty beds; that the greater part of the additional outlay Mr. Snell's paper attributed to circular wards is due to this arrangement; that the rest of the additional outlay is wasted in providing excessive cubical and floor-space, if only twenty-two patients are placed where thirty might be.

With Mr. Waddington's help I have proved that a circular ward, presenting the advantages ours here does, may be erected at the same cost as a parallelogram ward of smaller dimensions than the one Mr. Snell adopted in his paper.

The conclusion to be drawn, I think, is that the question of circular wards is still an open one, and that practical experience of their working can alone determine their value.

* On a Circular System of Hospital Wards. Smith, Elder, & Co. 1s.

* Practical Hygiene. By Dr. Parkes. Fourth edition, page 141.

† Report of the Committee appointed to consider the Cubic Space of Metropolitan Workhouses, p. 4.

‡ Paper, by Captain Douglas Galton, appended to above Report, p. 28.

Had it turned out that circular wards were more costly than rectangular ones, the question, as to whether the advantages they offer were worth this cost would have come up.

In every ward there are patients able to be out of bed, but not able to leave the ward. The circle gives them space to sit in without undue proximity to those confined to bed; it gives better space for meals and for the attendants to discharge many of their duties with greater freedom.

The compactness of the space is of great advantage in the heating. The central equidistant source of heat secures a more equable temperature and more equable ventilation in the ward; the comfortable fire is just where there is most room for patients who are apt to enjoy it without disturbing those in bed; the outer wall may be warmed with hot-water or steam pipes, and thus aid in warming the air near the patients' heads. The lessened wall-space economises the fuel necessary to secure comfort.

The compact space is more equally and more economically lighted by artificial light, and the very great advantages in such a climate as ours of having all the sunlight that is going shining directly into one window or another is secured.

As to ventilation, in the circular ward we never have the wind blowing directly on a straight wall against which half our beds are placed, and necessitating the closure of every ventilating opening and window on that side of the ward. We never want wind blowing through our wards, but for ventilation we desire the ingress of a gentle current of air, at a speed, if possible, of not more than 1 ft. 6 in. per second.

However the wind blows, we have it sweeping round the circle, and by its aspirating effect gently drawing the air from the ward.

Just as in the rectangle we may have any number of flues in the outside wall, and outlets in the ceiling; and, in addition, we can have a powerful central ventilating-shaft, equidistant from the whole of the outer wall, drawing equably from every direction in the ward. In our case we have also an inside wall, less than 22 ft. distant from the outer one, in which ventilating-flues are placed, and we have above, just 11 ft. from the outer ward wall, the outer wall of our day-room, affording facilities, if need be, for upward flues, straight up from the middle of the ceiling. We have, too, such an amount of cubic space in our ward, that, if the air is changed every half-hour, 4,000 cubic feet of air per bed will be supplied.

Internally the ward presents no corners, while externally its shape, receding at all points from adjoining buildings, secures a great amount of isolation.

The circle settles the vexed question of the proper ward axis and aspect, and settles it to the satisfaction of every reasonable man.

The compactness of the form allows a day-room and promenade on the roof, where the patient may have air and exercise without, practically, leaving the ward at all.

As to the adaptability to different sites, I must refer to Professor Marshall's pamphlet, where the advantages of the circular system are set forth clearly, concisely, and conclusively.

JOHN BROWN.

Burnley, Nov. 3rd, 1885.

"ITALY FOR STUDENTS."

SIR,—I shall be happy to receive the names of any members of the Architectural Association who would be willing to form a party to go to Italy for three weeks at Easter next year in the way suggested by Mr. Blashill in the paper read by him at the meeting of the Association on Friday last, reported in your present issue. It is proposed to form a sub-committee to obtain information on the subject at once.

HERBERT D. APPLETON.

Newcastle-on-Tyne.—Messrs. R. Stephenson & Co., of Newcastle-on-Tyne, have made arrangements to take over the shipyard and works of Messrs. McIntyre & Co. (Limited), at Hebburn-on-Tyne. The principal shareholders in McIntyre & Co. (Limited), will retain a substantial interest in the business, which will consist of shipbuilding, marine, locomotive, and general engineering works. This will probably necessitate the removal of all Messrs. Stephenson & Co.'s marine work to Hebburn, and the construction of large docks there.

VILLA COMPETITION.

SIR,—A few weeks since an advertisement appeared in the *Builder* inviting plans for a villa at Feltham, premium 10*l.*, the receiver of which could please himself whether he carried the work out at the usual commission or not. As I sent in a plan at the specified time (October 15th), I expected to see the name of the selected one published in the *Builder* for October 31st, as stated in the printed particulars sent me. As I have failed to see anything up to this date, I should be glad to know why the party has not complied with the particulars.

Does he intend to keep all the drawings sent in? And will he have the good manners to say whether they may be had, if the authors forward him three penny stamps to pay the postage? By inserting this you will oblige A COMPETITOR.

*** We have received other complaints on this matter. The answer appears in this week's number, but the advertiser ought, in courtesy to the competitors, to have advertised on the date promised.

DESIGN FOR A BANK.

SIR,—One hardly knows for whom to be most sorry, —the author of "A Bank for a Country Town" (see the *Builder* of October 31st), or those who awarded to this design the Architectural Association Medal. The letterpress describes it as "practical."* I venture to think that the author has much reason to be thankful that the design is unlikely ever to be practically carried out.

The façade, though rather flat for a country town, is no doubt quaint and, in a way, attractive. But the waiting-room, where much light is, —if not undesirable,—unimportant, has nearly as much direct window-light as the bank-room, which is about four times the size of the waiting-room, and where good light is of the utmost importance. Not only is the light in the bank poor, but it is badly distributed. The half of the counter nearer the fireplace would get very little light; besides, what light there is, is wrongly placed. The clerks want it full on their books and on the counter; still more should there be good light on the faces of the customers. When a stranger presents a cheque, the cashier looks hard at him. If there is anything wrong, a good light may discover it at once. I make no account of the glimmer that may come from the area at the back. That would help the clerks at the counter but little.

I see no name up. One does not see it at Coutts's, but in a country town one does rather look for a name or title on a bank. Whether a six-story building,—for this is six, including cellars,—is wise in a country town, where land is comparatively cheap, may be questioned.

Taking the principal bedroom-floor to be 10 ft. clear in height, and supposing, of course, that the heads of the windows are properly near the ceilings, the cills of the chief bedrooms would be about 5 ft. above the floor. Rather too high, one would say, for light or comfort.

A bank manager's cook would rather call out at having no scullery; and one external door for the family, servants, tradesmen, and others, would be found to present much practical inconvenience.

There is no coal-store anywhere near the kitchen or the house part of the building, and water-closets for the family and servants are left to the imagination or the upper story.

It is not real, practical architecture that makes a taking exterior, and leaves the plan and interior full of inconveniences and discomfort. It is this sort of designing that brings architects and so-called architecture into disfavour with the public.

A COUNTRY ARCHITECT.

THE NEW GOVERNMENT OFFICES.

SIR,—As the President of the Institute informed his hearers that the architects of the above intended building had told him that the superficial area of the courts is larger than in the Palace of Westminster or the Royal Courts of Justice, and very little less than the Foreign Office, you would oblige me, as the writer of a former letter on this subject, if you could print the notes on which my statements were based.

Courts in Proportion to Solid Building.

Newgate Prison	Equal.
Farnese Palace	Equal.
Whitehall Palace (Inigo Jones's plan)	One-half.
Longleat, Wilts	One-half.
Somerset House	One-half.
New Government Offices	One-eighth

My object in writing upon this matter is entirely in the hope of helping the architects, should they think well to ask the Government to be allowed to reconsider their plans before they are executed.

All the competitors were, in my opinion, rather unfairly influenced and misled by the block plan published by the First Commissioner of Works in the *Nineteenth Century* for Nov., 1882. This plan clearly indicated the principle that would be approved at "the Office of H.M. Works and Public Buildings," of which the Chairman of the Judges in the competition was chief. The hint was irresistible. The principle of plan was thus the same in all the designs that the public have been allowed to see, viz., a series of small internal courts, entirely surrounded by buildings about 100 ft. high. The result is that, in block, the building looks more like an immense fortress than a nineteenth-century Government office.

As a veteran, having no personal interest whatever in the matter, —except as one of the public,— my sole wish is that the winners of this splendid architectural prize shall make no mistake that may endanger their future reputation. They have referred for justification to the plans of the Royal Courts of Justice,—an unfortunate reference, as that building, however fine its architectural detail may be, has been violently criticised and condemned as dark and inconvenient in arrangement.

T. R. A.

* This is not quite accurate. The author of the design, whose remarks were printed with it, said, "an endeavour had been to make the design a practical working one, and to give it some distinctive character of its own."—ED.

AN ARCHÆOLOGICAL QUERY.

SIR,—In the life of Sir C. Wren, by James Elmes, London, 1823, reference is made, p. 270, to "an original MS. in my possession.—J. E."

It is described as a folio manuscript book of orders and proceedings of the Privy Council, and as containing many valuable autographs, &c. It is also stated to belong to the author.

Where can this MS. be?

Was this James Elmes the architect of St. George's Hall, Liverpool? *

From internal evidence the book shows that there were other men of this name practising as architects.

Perhaps some one of your readers could state the date and place of death of the author of the biography, and by this means the MS. might be traced, if its present whereabouts is not known.

F.S.A.

* Certainly not. His name was Harvey Lonsdale Elmes.—ED.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Nov. 3.

By WARD & CLARKE.

Bow-road, near the Station—A plot of freehold land, area 6,500 ft.	£700

By C. A. RICHARDS.

Regent-street—26, Foubert-place, freehold	1,750

By CHINNOCK, GALSWORTHY, & CO.

Portland Town—18, Henry-street, 32 years, ground-rent 5*l.*	460

By J. M. JOHNSON.

Clapham—31, 32, and 33, Park-crescent, 97 years, ground-rent 9*l.* 9s.	655
Gray's Inn-road—50, Acton-street, 53 years, ground-rent 5*l.*	505

By ELLIS & SON.

Policy for 500*l.*, Life, aged 61 years	250

By G. A. WILKINSON.

Clerkenwell—32 and 34, Warner-street, freehold	1,400
Hackney—409, Mare-street, 62 years, ground-rent 10*l.* 10s.	1,310
Hornsey—Ground-rents of 43*l.* 15s., reversion in 63 years	1,310
Ground-rents of 36*l.* 10s., reversion in 80 years	1,095
Ground-rents of 24*l.*, reversion in 75 years	725
Ground-rents of 55*l.* 18s. 6d., reversion in 62 years	1,675
Ground-rents of 146*l.*, reversion in 63 years	4,406
Eaton-square—7, Lower Belgrave-street, leasehold	970
Marylebone—An improved rental of 110*l.* 5s., term 24 years	1,280
Lambeth—An improved rental of 40*l.*, term 37 years	710
Wandsworth—An improved rental of 74*l.* 16s., term 22 years	760

Nov. 4.

By MURRELL & SCORELL.

630 fully paid-up shares of 5*l.* each in Gosling & Co., Limited	595

By BLAKE & DANNATT.

Lewisham-road—No. 162, term 22 years, ground-rent 9*l.*	540
Lewisham—52 and 53, Thurston-road, 71 years, ground-rent 5*l.*	500
New Cross—28 to 36 even, Baildon-street, 40 years, ground-rent 18*l.* 15s.	405

By DALE & SON.

Islington—52 and 54, Church-road, 29 years, ground-rent 9*l.*	750
3, Coleman-street, 41 years, ground-rent 4*l.* 4s.	350

Nov. 5.

By FAREBROTHER, ELLIS, CLARK, & CO.

Haymarket—Ground-rent of 89*l.*, reversion in 95 years	2,360
No. 63, Rupert-street, freehold	2,000
Mitcham—Freehold rental of 60*l.*, reversion in 24 years	1,610

By FULLER & FULLER.

Stoke Newington—259 and 261, Amhurst-road, 79 years, ground-rent 14*l.* 14s.	1,320

By NEWBON & HARDING.

Stoke Newington—134, Green-lanes, freehold	1,130
84 and 92, Kynaston-road, 79 years, ground-rent 12*l.*	410
Islington—17, Cross-street, freehold	750
Bayswater—27, Northumberland-place, 60 years, ground-rent 6*l.* 6s.	480
Highbury—11, Aberdeen Park-road, 72 years, ground-rent 8*l.*	335

By HARDS & JENKINSON.

Stamford Hill, Fawcett-terrace — Ground-rents, 88*l.* 10s., reversion in 97 years	1,925
Probert-terrace—Ground-rents 74*l.*, reversion in 97 years	1,555
Regent-terrace—Ground-rents, 40*l.*, reversion in 97 years	835
Leopold-terrace—Ground-rents, 17*l.* 10s., reversion in 97 years	375

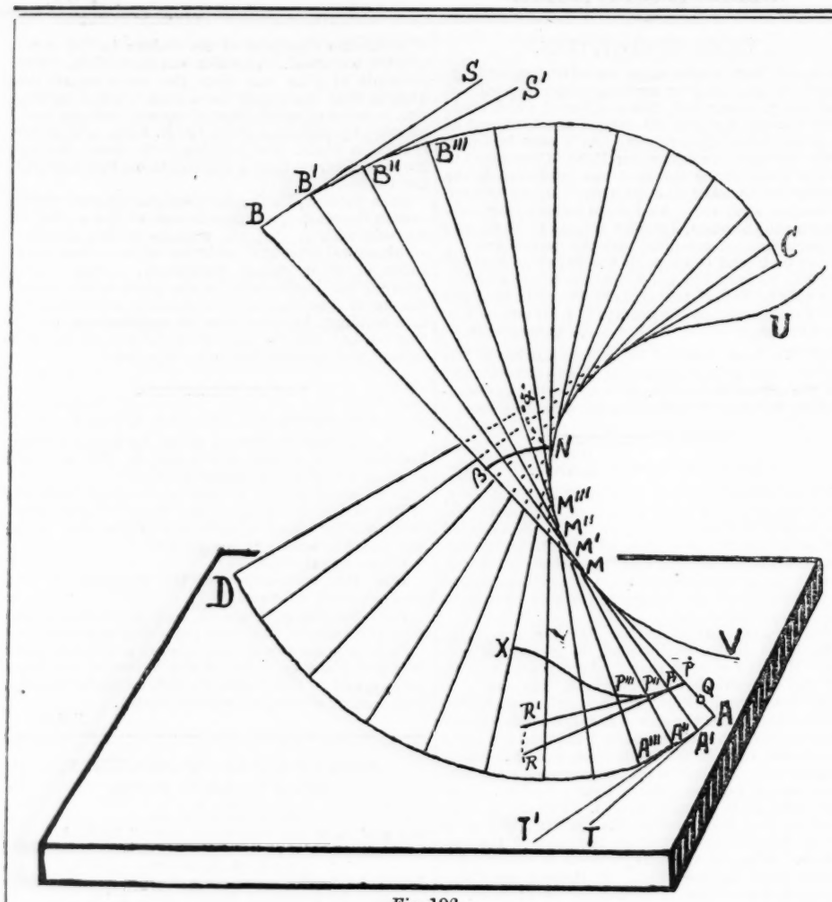


Fig. 196.

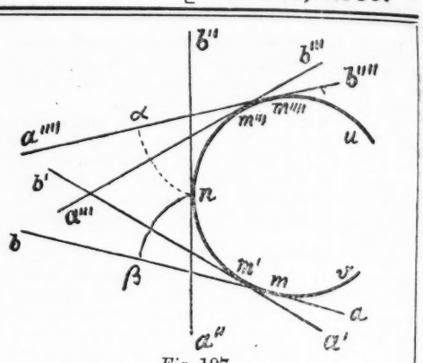


Fig. 197.

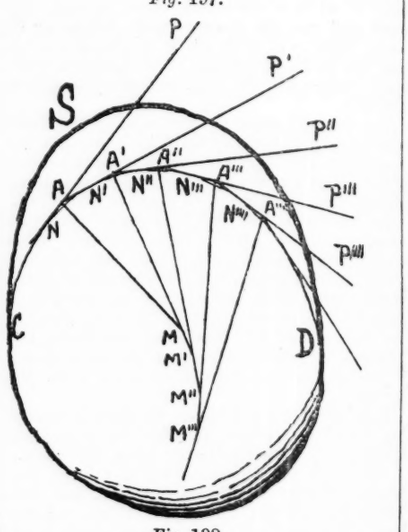


Fig. 198.

The Student's Column.

DESCRIPTIVE GEOMETRY.—Part II.

XXIV.

NOW, to continue the subject of last week, let us examine (fig. 196) a developable surface in general. We suppose a surface engendered by a *straight line which moves through space in such a way that two consecutive positions of that line are contained in a plane.* For instance, in our figure (which the reader must not consider as a plane surface, but as a perspective view of a spider's web) the lines A B and A^1 B^1 meet in a point M^1, the lines A^1 B^1 and A^{11} B^{11} meet in a point M^{11}, and so on for every successive generator of the surface. The successive intersections of the generators would form in space (not in a plane) a polygon M M^1, M^{11}, M^{111}; but, when we suppose that the generators are infinitely close to one another, the polygon becomes a *skew curve*, such as V M M^1, M^{11}, U, to which all the generators are tangent. This curve is called an *arris of retrogression*; we shall see why hereafter.

The surface so formed is developable on a plane, for it is formed of plane elements, and we can turn round the generator A^1 B^1 as a hinge, the plane contained between the generators A^1 B^1 and A^{11} B^{11}, bringing thereby that element in the same plane as its neighbour, the plane which contains the generators A B and A^1 B^1. Continuing the same operation on the next element and on the next . . . . we can develope the whole surface on a plane without any rent whatever.

The system of generation we have described is that of all developable surfaces, of which cones and cylinders are only special cases. We can therefrom come to the following conclusions:—

A plane tangent to a developable surface in any one point is tangent to the surface all along a generator, for the point is situated on the infinitely narrow *strip of a plane* which contains two neighbouring generators of the surface. Therefore, *the plane, tangent to the surface in the point* Q, *is the plane which contains the generator* A B *and the tangent* A T *to any curve on the surface passing through a point of the generator* A B. This shows that the method we used to find the tangent planes to cones and cylinders is applicable to all developable surfaces. We shall soon study other surfaces which are also generated by straight lines, but the tangent planes to which have not the above property, for they are *skew surfaces.*

We observe also that the plane of the superficial element AM^1A^1, or, what is the same thing, the tangent plane BAT coincides exactly with the *osculating plane* of the arris of retrogression VMU, for it contains the lines AM^1 and A^1M^1, which are both tangent to this curve.

In fig. 196 we called the curve VMU an arris of retrogression, because *the surface forms two sheets, with the curve* VMU *as a sharp arris between the two sheets.* This is a characteristic feature of all developable surfaces. The reader will perhaps be able to conceive how this takes place by examining the fig. 197. The curve VMU (fig. 196), being a curve in space, can be considered as delineated on the surface of a cylinder, we suppose (fig. 197), the curve *v*, *m*, *n*, *u* to be the base of that cylinder. As the generators of the surface are tangent to the curve VMU (fig. 196), they will be tangent to the cylinder *v*, *m*, *n*, *u* (fig. 197), and we can conceive the surface formed by a straight line *a b* in rolling on a cylinder without sliding. If we examine a point β of the line *a b* we shall see that, as the generator *a b* rolls on, the point β moves towards the cylinder by a curve β *n*, then moves away from the cylinder by a curve *n a*, forming a sharp angle in the point *n*. This point *n* is a point of the line VMU, and therefore this line must form a sharp arris of the surface. (The curve $\beta N a$ is shown also in fig. 196.)

In a cone the arris of retrogression is reduced to a point, and in a cylinder it may be considered as infinitely distant.

We now know what are the conditions which the generators of developable surfaces must fulfil, but, *how are we to produce such a surface?*

After having taken in space two curves (fig. 196) such as AD and BC, if we were to connect any point A of the first curve with any point B of the other, we could not possibly say that the neighbouring generators would be in the same plane. We select a point A on the lower curve: draw a tangent AT to that curve; then, draw a tangent BS to the upper curve parallel to the former tangent AT. Now, we can say that the line AB is a generator of a developable surface; for, the elements AA^1 and BB^1 of the curves (being infinitely small) are part of the tangents; the tangents being parallel are in the same plane, and, therefore, the two generators AB and A^1B^1 are in the same plane. By repeating this operation for a number of points of the directing curves AD and BC we could produce a series of generators of the surface.

There is also another method of producing the surface. We adopt the arris of retrogression VMU as the sole directing curve, and make a straight line as generator to move in space, remaining *always tangent to the directing curve.* In such a surface the neighbouring generators will be contained in the same plane; for, as the generator AB (fig. 196) touches the curve VMU along the element MM^1 and the generator A^1B^1 touches the same along the element M^1M^{11}, these generators intersect one another in the point M^1, and are, therefore, in the same plane. Such is the mode of generation of the developable helicoïd, for instance.

The surface can also be engendered in the following way:—

If on a given surface (fig. 198), which we shall simply designate as the surface S (in the drawing consider the surface S as made of glass), we delineate a curve C N . . . D; then, through points infinitely close N, N^1, N^{11}, ... taken on that line we produce tangent planes P, P^1, P^{11} . . . . . to the surface (we have figured these planes by the lines N P, N^1 P^1, N^{11}, P^{11} . . . . . only), these planes will cut one another consecutively along straight lines, such as A M, A^1 M^1, A^{11} M^{11} . . . ., lines which will be two by two in the same plane. The lines A M, A^1 M^1, A^{11} M^{11} . . . . . will be, therefore, the generators of a developable surface, and, as they are touched by the tangent planes P, P^1, P^{11} . . . ., we can consider the developable surface as produced by a plane rolling over a curved surface, S, and in continuous contact with a curve, C N . . . D, delineated thereon. In other words, *a developable surface is the enveloping surface of the various positions taken by a movable plane moving through space according to some given law.* For instance:—

The plane may roll, as in our example, in contact with a line of a given surface. As an example of this generation, a plane rolling along the parallel of a sphere will engender a cone, and rolling along the equator of a sphere it will engender a cylinder.

The plane may roll on two curved surfaces

simultaneously. Neither of the surfaces must be developable, as otherwise the plane would touch one generator of that surface and a point of the other, and, therefore, could not move.

The plane may be bound to osculate a given curve. In that case, the curve will be the arris of retrogression to the surface produced.

The plane may in moving remain always normal to a given curve, for, in that case, the consecutive positions of the plane will cut one another along straight lines contained two by by two in the same planes.

We shall now examine (fig. 196) *what conditions a curve* P P^1 . . . X, *delineated on a developable surface must fulfil to be the shortest line between two points* P *and* X.

The curve must, of course, be transformed in a straight line when the surface is developed. Now, we have seen that a curve is transformed in a straight line when each two neighbouring elements of the curve make equal angles with the intermediary generator; we must have, in fact, in each point of the curve the angle $M P^1 R = M^1 P^1 P^{11}$. This is, therefore, the condition the curve must fulfil to be the shortest distance between two points. This leads us to another important property of that curve.

The shortest curve from the point P *to the point* X *has all its osculating planes normal to the developable surface.*

From what we have said above, the two tangents P P^1 R and P^1 P^{11} R^1 form equal angles with the generator $A^1 M^1$; these tangents belong therefore, to the generators of a cone of revolution the axis of which is the line $A^1 M^1$; the plane R P^1 R^1, which contains the two infinitely close generators of the cone P^1 R and P^1 R^1, is, of course, tangent to the said cone along its generator P^1 R. But in every surface of revolution the tangent plane is perpendicular to the meridian plane which passes through the point of contact; the plane R P^1 R is, therefore, perpendicular to the plane A M^1 A^1, which is a meridian plane of the cone as it contains the axis A^1 M^1 and the generator P^1 R. Now, the plane R P^1 R^1 is the osculating plane (it contains two tangents) of the shortest curve, and the plane A M^1 A^1 is the plane tangent to the developable surface.

The above property of the shortest line is not limited to developable surfaces, but extends to all surfaces whatever. Let (fig. 198) the curve C N . . . D be the shortest line berween the points C and D of the surface S. If we roll a plane along the line C N . . . D, we shall generate, as we have seen, a developable surface, which we will call S^1. If the curve C N . . . D was the shortest line on the first surface S, it will be also the shortest on the second surface S^1; but in that case the osculating planes of the curve will be perpendicular to the planes tangent to the surface S^1, and as these tangent planes are common to both surfaces, we can conclude that *on any surface the shortest line between two points has all its osculating planes normal to the surface.* This property is of the highest importance for the jointing of masonry.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

12,368, Builder's Hoist. J. Tottenham.

An endless band runs over rollers, one on the ground and the other forming the barrel of a windlass mounted on the scaffolding. The band is made in sections, which are united by links, having cross-pins, upon which are hung double hooks. Baskets or other articles are hung from these hooks, and lifted or lowered as required.

13,588, Purifying Drainage Waters and Sewage. E. Capitaine.

Silicic acid hydrate is added to the water for separating the lime in the form of a dense and compact sediment. In cases where the waters to be treated do not contain free lime it is only necessary to add the same in very small quantity, and then to separate the lime again by the silicic acid hydrate. For the separation of organic, that is, nitrogenous readily putrefying and fermenting bodies, silicic acid hydrate with lime in conjunction with soluble aluminium salts is employed.

14,010, Portland Cement. H. J. Cooper.

Lime, chalk, limestone, or other suitable calcareous material is added to molten iron slag not containing large proportions of iron oxides or sulphur. As the slag flows from the furnace 100 parts of the powdered calcareous material are added to about 35-50 parts of slag. The materials are thoroughly mixed by rollers or other apparatus, and then, if necessary, furnaced to complete the formation of the clinker, which is cooled, granulated, and ground.

9,685, Burglar and Fire Alarms. G. Pearson.

Electrical contacts are arranged on the doors and windows, so that on any attempt to open them an electrical circuit is completed, and a current from a battery flows through the coils of a magnet. An armature is thereby attracted, and releases a weighted lever carried by a gas tap. By this means a red lamp outside the house previously just alight is turned up, and at the same time a bell is rung in any room as desired. When the apparatus is required to act as a fire-alarm, a thermometer with contact wires is placed in the circuit, the latter being completed by the rise of the mercury.

13,472, Fireplaces. H. Thompson.

The bottom and back of the grate are formed of hollow bars open at their lower ends, and closed at the upper, with perforations in the back to allow air passing through them to enter a chamber. The ash-pit is closed, and has a flue at each side near the front. The smoke from the fire passes between the bars into the chamber, and mixes with the heated air coming through the bars; the products then pass through the ash-pit and flue, round the ovens and boilers, and return through the flue, under the ash-pit, to the chimney.

13,129, Adjusting Windows, &c. M. Rowcliffe.

A strip of metal or other hard material is fixed on the edge of the sliding part; a tapered cavity, widest at the top, is made in the fixed frame. A roller or ball works in the cavity and jams the window, &c., at the required height. The window is released and made free to move up or down by pressing a thumb-piece on a bell crank lever; this raises the ball or cylinder, and the window is free to move until the pressure is taken off the lever, when the ball falls, and the window is immediately re-jammed.

NEW APPLICATIONS FOR PATENTS.

Oct. 30.—13,057, S. Wright, Emptying Water from Cisterns, Reservoirs, &c.—13,066, J. Hopkinson and C. Gibson, Retaining Windows in any position.—13,078, C. Hunt, Combined Reflecting and Ventilating Apparatus.—13,079, J. Tucker, Weather Bar for Doors and Windows.—13,086, E. Morris, Improvements in Sanitary Pans.—13,097, B. Finch, Ejector Cowls.—13,098, J. Ebner, Parquet and other Floorings.—13,110, W. Lake, Apparatus for Facilitating the Nailing of Laths.—13,115, J. Haylor and Others.—Apparatus for the Manufacture of White Lead.

Oct. 31.—13,130, J. Deeley, Water-closet and Urinal Pans or Basins.—13,140, J. Pierret, Waterproof Cloth, Felt, Board, Paper for Roofing, &c.—13,142, J. and C. Christie, Waste-preventing Flushing Apparatus for Water-closets, &c.—13,143, F. Chambers, Construction of Shop-fronts.—13,159, J. Pointon, Anti-fouling and Anti-corrosive Paints or Compositions.—13,173, W. Brewer, Devices for Fastening Windows.

Nov. 2.—13,198, F. Caws, Ventilating.—13,219, F. Moir, Improvements in Window Sashes for Ventilation.—13,220, J. Buzzard, Fastenings for Trap Doors, &c.

Nov. 3.—13,233, T. Woods, Stone-cutters' Tools.—13,247, H. Headland, Smoke-preventing Chimney Pot.—13,256, P. Jahn, Planing Machines.—13,271, S. Sutcliffe, Tile Grate Fronts and Tile Grates and Chimney-pieces Combined.—13,292, H. Denne, Window Fastener.

Nov. 4.—13,300, T. Gibson, Invalid's Electric Call Bell.—13,308, J. Donald, Paving Streets and Roads.—13,321, J. Simmons, Window Fastenings.—13,325, H. Davidson and H. Hart, Improved Socket Pipes.—13,327, J. Green, Improvements in Dry Closets, &c.—13,328, T. Smith, Manufacture of Cements.—13,329, J. Beresford and W. Restall, Improvements in Water-closets.—13,332, C. Lawrence, Ventilating Apparatus.—13,336, H. Haddan, Ventilating Tunnels, &c.—13,352, E. Aldous, Chimney Top or Ventilator.

Nov. 5.—13,371, J. and W. Smith, Hanging and Supporting Sliding Window Sashes.—13,373, W. and H. Sutcliffe, Improvements in Ball Taps.—13,395, H. Sporton, Water Meters, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,098, R. Stone, Manufacture of Cement.—11,309, C. Sullivan, Machine for Dredging and Excavating.—11,534, F. Cox, Fastening for Sashes, Casements, &c.—11,552, C. Lea, Construction of Door Knobs.—11,695, H. Thompson, Improvements in Kitcheners, Open Grates, and Stoves.—11,939, G. Chandler and Others, Chimney Top or Ventilator.—12,390, J. Armstrong, Improved Forms of Building Materials.—12,403, J. Deeley, Flushing Cisterns.—12,468, J. Cushing, Improved Water-closet Basin.—12,471, S. Johnson, Apparatus for Flushing Closets, Drains, &c.—11,734, G. Brodie and J. Prior, Safety Catches for Window-sash Fastening.—11,810, J. Nield, Portable Extension Ladders.—12,045, J. Gilmore and W. Clark, Ventilating Apparatus.—12,056, T. Normanton, Ventilating Apparatus.—12,156, J. Bedford, Ventilator, and Fixing same.—12,309, J. Kent, Machine for Jointing, Grooving, &c.—12,507, H. Long, Bolt with Plate or Plates for Lavatories or Water-closets.—12,525, W. Scrymgour, Construction of Floorings, Roofs, &c.—12,580, S. Smith, Automatically Flushing Closets and Drains.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

16,057, J. Rhodes, Cupboard-door Turns.—10,605, J. Moore and H. Salomon, Combined Table and Writing-desk.—11,202, E. Smith, Folding Chair.—11,698, J. Rae, Simplifying Repairs to Water Fittings by an Improved Water-tap.—16,882, W. Hassall. Fireplaces or Furnaces for Bricks or other Kilns.—101, T. Greenwood, Improved Hinge.—373, H. Lake, Excavators.—664, T. Ward, Hoisting Apparatus.—841, C. Shields, Improved Means for Jointing Lead Pipes.—1,340, W. Gedge, Machine for Cutting, Planing, and Shaping Wood.—2,691, C. Billington and J. Newton, Fastening Knobs to Spindles.—4,566, J. Barwick, Ceiling Ventilator.

MEETINGS.

SATURDAY, NOVEMBER 14.

British Museum (Archaic Room).—Miss J. E. Harrison on "The Parthenon Marbles." (II.) 11 a.m.

MONDAY, NOVEMBER 16.

Royal Institute of British Architects.—Mr. William Woodward on "London as it is and as it might be." 8·0 p.m.

Architectural Section, Philosophical Society of Glasgow. Presidential Address by Mr. William Landless.

TUESDAY, NOVEMBER 17.

Institution of Civil Engineers.—Further discussion on the papers by Professor Osborne Reynolds and Mr. Brightmore on Steam Engine Indicators." 8 p.m.

Statistical Society.—Sir Rawson W. Rawson on "International Statistics, illustrated by Vital Statistics of Europe and of some of the United States of America." 7·45 p.m.

WEDNESDAY, NOVEMBER 18.

British Archæological Association.—(1) Mr. W. De Gray Birch on "The Art of the Roman Pavements at Bignor." (2) Mr. C. H. Compton on "The Church of St. Nicholas, Coslany, Norwich." (3) Mr. John Harris on "The Saxon Font in South Hayling Church." 8 p.m.

Society of Arts.—Opening Address of the Session, by Sir Frederick Abel, F.R.S. 8 p.m.

South Kensington Museum (Lecture Theatre).—Miss J. E. Harrison on "The Mythology of the Iliad as illustrated by Greek Vase Paintings." (III.) 5·15 p.m.

Builders' Foremen and Clerks of Works Institution.—Ordinary Meeting. 8·30 p.m.

Royal Meteorological Society.—Three papers to be read. 7 p.m.

THURSDAY, NOVEMBER 19.

York Architectural Association.—Mr. S. Harrison on "Mediæval Stained Glass." 7 30 p.m.

Dundee Institute of Architecture.—Mr. John Young on "Architects: their Work, and how viewed by the Public." 7 p.m.

FRIDAY, NOVEMBER 20.

Architectural Association.—Mr. L. Harvey on "The Connexion between Dress and the Art of Composing, illustrated by various Examples taken from the late Professor Semper's 'Lessons on Style.'" 7·30 p.m.

University College.—Professor C. T. Newton, C.B., on "Greek Myths illustrated by Fictile Vases and other Monuments." 4 p m.

Institution of Civil Engineers (Students' Meeting).—Mr. John Goodman on "Recent Researches in Friction." 7·30 p.m.

SATURDAY, NOVEMBER 21.

British Museum (Archaic Room).—Miss J. E. Harrison on "The Parthenon Marbles." (III.) 11 a.m.

Miscellanea.

Royal School of Mines.—On Monday, the 9th inst., Professor Warington Smyth, M.A., F.R.S., commenced a course of lectures on mining, in the theatre of the Geological Museum, Jermyn-street. After referring to the enormous capital which the mining interest represents, he dwelt at length upon the conditions which have contributed to render the working of minerals in this country one of the most important branches of our industry. The student ought fully to realise that the main object of lectures and study in a question of the nature of mining, is emphatically this,—to enable him more quickly to understand problems presenting themselves in actual operations, and not to supplant the all-important necessity of experience itself. The different systems which obtain in different countries regarding the right of working minerals, has affected very materially the internal development of mining as an art. In every country in Europe except Britain, the Government reserves to itself the right to minerals below the surface of the ground. The freedom which exists at home in this respect has afforded opportunities for enterprise and activity which the Continental system of Government supervision is always calculated to more or less discourage.

City and Guilds of London Institute for the Advancement of Technical Education.—Alderman Sir R. N. Fowler, bart., M.P., has consented to present the Institute's scholarships, prizes, and certificates, at a meeting to be held on Wednesday evening, December 9th, at the Salter's Hall, St. Swithin's-lane, E.C. The Lord Mayor will preside.

Association of Public Sanitary Inspectors.—On Saturday evening last, the opening meeting of the third annual session of the above important body took place at 1, Adam-street, Adelphi, the inaugural address being delivered by the Chairman of the Council, Mr. G. B. Jerram, A.M.I.C.E. After referring to the loss of that eminent sanitary reformer, Lord Shaftesbury, an honorary member of the Association, and to the increase of public interest in sanitary questions, as evinced by the Health Exhibition, the paper chiefly addressed itself to the recommendations contained in the first report of the Royal Commission on the Housing of the Poor, and the Public Health (Metropolis) Bill introduced last Session by Lord Salisbury, and read once in the House of Lords. Mr. Jerram remarked that while the evidence taken by the Commission had revealed, not only in the Metropolis but in other large towns, and in the cottages of the rural districts, incredible defects in house-drainage, the condition of ashpits and dustbins, and the collection of refuse, far more of such defects would have been revealed had the evidence of Medical Officers of Health, Surveyors, and Inspectors of Nuisances been called for. The most useful proposal of Lord Salisbury's Bill was that which provided for the consolidation of the fourteen Sanitary Acts affecting the Metropolis, assimilating them to those in force for the rest of the United Kingdom under the Public Health Act of 1875. A discussion followed the reading of the paper.

Bolton Art Club.—At the monthly meeting, held last week, at the club-rooms, Mr. John B. Gass, A.R.I.B.A., holder of the Godwin Bursary, 1885, delivered a lecture on "Art Reproducing Processes." The lecture was well illustrated by examples of the different processes referred to, which were classified into two groups, intaglio or incised work, and relievo or projected work. In the first group the lecturer described the history and methods of engraving, photogravure, etching, and aquatinting, each process being clearly and concisely explained. In the second group wood-cutting and the production of electrotypes were described at length, as also were lithography and chromo-lithography, and reference was made to the new French process by which a coloured print is obtained at one impression. Typographic etching and graphotype were mentioned, and the application of photography in photo-lithography, ink photos., &c., and zincography, was well illustrated, printing blocks being handed roundfor inspection. Photo-etching was referred to, and the different methods of printing illustrations direct from photographs, and without the intervention of engraver or draughtsman, were described, and plates and prints were shown of the luxotype, Macbeth's, the Meissenbach, and other processes.

St. Patrick's Cathedral, New York.—Preparations are being made for the erection of two white marble spires on the front of St. Patrick's Cathedral, New York. The total height of the spires will be 180 ft., and they will be of Gothic design. The lower portion, or tower, is to be octagonal in shape, with a height of 67 ft. A marble cross will be placed on the extremity of each spire. The cost is estimated by the architect, Mr. James Renwick, at 190,000 dols., or 47,500*l.* sterling. The cathedral, which has taken such a length of time to construct, will be practically completed as soon as the spires are erected.

Edinburgh Architectural Association.—On the 5th inst. the opening meeting of this Association was held in the Professional Hall, 20, George-street. There was a large attendance. Mr. George Washington Browne, the President, gave an inaugural address on the "Monastic Orders and Buildings in Scotland." At the close, a hearty vote of thanks was accorded Mr. Browne for his address. A collection of photographs and drawings, lent by members of the Association, was exhibited in the hall.

Proposed Naphtha Pipe from Bakou to Batoum.—A project has been submitted to the Russian Minister of Public Works for the construction of a conduit for the conveying of naphtha from Bakou to Batoum, a distance of 800 versts, or about 530 miles. A private company has already undertaken to construct it.

Utilisation of Salt Water for Towns.—The Kirkleatham Local Board of Health, Coatham, Redcar, have instructed their Surveyor (Mr. James Howcroft) to carry out a salt-water scheme for street-watering and private purposes, in accordance with plans prepared by him.

Largs Free Church.—We received the following details in regard to this church, illustrated in our last number, too late for publication at the time. The church, as erected in 1843, was a plain rectangular building, 69 ft. by 41 ft., without any attempt at ornament. It is now being altered from plans prepared (as already mentioned) by the late Mr. A. J. Grahame, architect, London. The illustration in our last shows the principal frontage, which stands directly fronting the Firth of Clyde. The tower stands in the north-west corner, and rises to the height of 90 ft. It contains the staircase leading to the new end gallery. The new vestibule is 7 ft. 6 in. wide, giving access to the area of the church by one wide central doorway: connecting with the vestibule there is a session-house. At present there are galleries at both sides and end of the building; these are to be removed and a new gallery at a lower level constructed at the end of the church. A transept, 24 ft. by 14 ft., with a gallery, is to be built out from the south side of the church, and an apse, 20 ft. wide, broken out in the east gable. The vestry will be in a low building immediately behind the apse. The present deep narrow pews are to be removed and the whole church to be re-seated; there are in all 600 sittings. The whole of the outside walls are faced with Giffnock freestone, the rubble being rough-hammer dressed, in broken courses. The estimated cost of the alterations is 2,700*l.*

Manuscripts of Leonardo da Vinci.—The Royal Academy of the Lincei, following the initiative given by France relative to the publication of the Manuscripts of Leonardo da Vinci, has undertaken the publication of the *Codice Atlantico*, of the Ambrosian Library at Milan. The enterprise will require eight years, with an annual outlay of 1,200 lire, which expense is already covered by a subscription fund of 96,000 lire, the principal contributors to which are the Grand Mastership of the Order of Saints Maurice and Lazarus, for the sum of 10,000 lire, King Humbert, the entire Cabinet, and the Academy of the Lincei. This *Codice Atlantico* is a manuscript, 65 centimètres by 44; containing 399 leaves and 1,750 designs, and comprising several volumes, the pages whereof have been separated and pasted upon drawing-paper. It formed part of the thirteen Manuscripts of Leonardo da Vinci sent to Paris from the Ambrosian Library of Milan in 1796, by Tinet, who was appointed by Bonaparte as Art Commissioner to superintend the official plundering. The manuscript in question was bestowed upon the National Library of Paris, but reclaimed in 1815 for the Ambrosian Library by Prince Schwarzenberg, the representative of Austria. The *Codice Atlantico*, together with other eleven Manuscripts of Leonardo da Vinci, were a donation to the Library by Arconati, in 1637. It is said that Charles I. of England in 1630 offered Arconati for one alone of these manuscripts one thousand Spanish doubloons, or about 2,400*l.*—*Tablet.*

Presentation.—A very enjoyable evening was spent at the "Foresters" at Tonbridge last Saturday, when a large number of the *employés* of the firm of Messrs. G. Punnett & Sons assembled under the presidency of Mr. James Trill, sen., to present to their late and much-respected foreman, Mr. John Fagg, a handsome testimonal in the form of a massive oak silver-mounted inkstand, bearing a suitable inscription, together with an illuminated list of subscribers. The meeting was a most hearty and enthusiastic one, Mr. Fagg having held the post for a period of upwards of thirty years, during which period he has been connected with many large and important works, both in Kent and Sussex. The esteem in which he is held by those with whom he has worked was manifestly evinced, and good wishes for his future welfare expressed, with a hope that in his retirement from the more active pursuits of business he may be spared in this the autumn of his life to spend his remaining years in health, quiet, and happiness. Mr. Fagg has for many years been connected with the affairs of the town of Tonbridge, and at the present time has the honour of occupying the chair of the Local Board.

Robert Boyle & Son (Limited).—We may remind our readers that the list of applications for shares in the company of Robert Boyle & Son (Limited) closes for London and country on Tuesday next, the 17th inst., as mentioned at the head of the prospectus to be found on our back page.

Accident Fund at Elswick Ironworks.—Among nearly 10,000 men hardly a day passes without some one having his arm crushed, his hand nipped, or his leg broken, and though everything is done that can be done for the prevention of accidents, carelessness will assert itself, and claim its average of victims. To provide against these accidents an "accident compensation fund" exists, whose latest report shows that the injuries only reach 7·4 per cent. The income of this fund exceeds 2,000*l.*, and is derived from the workmen, who subscribe every week in proportion to their wages, and from the masters, who each week add to the fund double the amount subscribed by those they employ. In connexion with the fund ambulance classes have been established, and of the seventy-eight who last presented themselves for examination, seventy-two passed successfully, thus giving a percentage of ninety-two against the All England rate of sixty-six. No statement would convey an idea of the importance of the injuries for which compensation is granted, for there is only one injury whose gravity is not left to the imagination, and that is death; but the lowest amount paid seems to have been 2s. 3d. for a bruised knee, while the highest was 150*l.*, the total of the allowances amounting to 1,500*l.*—*Leisure Hour.*

Leather v. Canvas.—The respective merits of leather and canvas hose have of late led to considerable controversy in various quarters, and much dissatisfaction has been expressed with regard to the canvas hose at present used by the Metropolitan Fire Brigade. The success of a brigade in extinguishing fires so largely depends upon the quality of the hose that it becomes a matter of first importance to ensure the durability and efficiency of this appliance. The substitution of canvas hose in lieu of leather in the Metropolitan Fire Brigade can hardly be justified by reference to past experience. The rubber-lined canvas hose at present so largely in use does not compare favourably with leather hose, either on the score of economy or practical efficiency. Its chief recommendation is lightness, which for brigade work is undoubtedly a consideration, for besides being more readily manipulated by the firemen, it can also be made in longer continuous lengths than leather hose, and so requires fewer joints. It is also cleaner and less troublesome to keep in order than leather, and these qualities no doubt recommend it to the firemen. Canvas hose can be manufactured to bear a pressnre of from 500 lb. to 600 lb. per square inch, but its capacity for enduring rough work and wear is vastly less than leather.—*Commercial World.*

St. Bride's Working Men's Club.—At the Hall of the above Club on Saturday evening last a lecture was given by Mr. Henry J. Pare on "Church Clocks, Ancient and Modern."

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. .....ton	6 10 0	7 10 0
Teak, E.I. .....load	13 10 0	15 10 0
Sequoia, U.S. .....ft. cube	0 2 6	0 2 9
Ash, Canada .....load	3 0 0	5 0 0
Birch ,, ...	3 0 0	4 10 0
Elm ,, ...	3 10 0	5 0 0
Fir, Dantsic, &c.	1 19 0	4 10 0
Oak ,, ...	3 0 0	5 0 0
Canada	6 0 0	7 0 0
Pine ,, red	3 0 0	4 0 0
,, yellow	3 15 0	5 5 0
Lath, Dantsic .....fathom	5 0 0	6 0 0
St. Petersburg	5 0 0	7 0 0
Wainscot, Riga.....log	2 15 0	4 10 0
Deals, Finland, 2nd and 1st...std. 100	8 0 0	9 0 0
,, 4th and 3rd	6 10 0	7 10 0
Riga	6 0 0	8 0 0
St. Petersburg, 1st yel.	9 0 0	15 0 0
,, 2nd ,, ...	7 0 0	8 15 0
,, white	8 0 0	10 10 0
Swediah.....	6 0 0	16 0 0
White Sea	8 0 0	19 0 0
Canada, Pine 1st	18 0 0	32 10 0
,, 2nd	12 0 0	18 10 0
,, 3rd, &c.	7 0 0	10 10 0
,, Spruce 1st	9 0 0	12 0 0
,, 3rd and 2nd	6 10 0	8 0 0
New Brunswick, &c.....	5 0 0	7 10 0
Battens, all kinds	4 0 0	13 0 0
Flooring Boards, sq. 1 in.—Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 0
Other qualities	0 5 0	0 7 0
Cedar, Cuba.....foot	0 0 3½	0 0 4
Honduras, &c.	0 0 3	0 0 4
Australian	0 0 3	0 0 3½
Mahogany, Cuba	0 0 5	0 0 7½
St. Domingo cargo av.	0 0 5½	0 0 7½
Mexican ,, ...	0 0 4	0 0 5
Tobasco cargo av.	0 0 4	0 0 6½
Honduras cargo av.	0 0 4½	0 0 6½
Rose, Rio .....ton	7 0 0	16 0 0
Bahia.....	6 0 0	14 0 0
Satin, St. Domingo .....ft.	0 0 0	0 0 0
Porto Rico	0 0 0	0 0 0
Walnut, Italian	0 0 4	0 0 5

METALS.	£.	s.	d.	£.	s.	d.
IRON—Pig in Scotland ....ton	2	2	6	0	0	0
Bar, Welsh, in London....	4	15	0	5	2	6
,, in Wales	4	7	6	4	12	6
,, Staffordshire, London	6	0	0	7	0	0
Sheets, single, in London....	7	10	0	9	0	0
Hoops ,, ...	6	5	0	7	5	0
Nail-rods ,, ...	6	0	0	7	0	0
COPPER—						
British, cke. and ingt. ....ton	43	0	0	44	0	0
Best selected	44	0	0	45	0	0
Sheets, strong....	52	0	0	0	0	0
,, India	48	0	0	48	10	0
,, Australian, fine cash....	0	0	0	0	0	0
Chili, bars ,, ...	38	15	0	39	5	0
YELLOW METAL....lb.	0	0	4¼	0	0	4¼
LEAD—Pig, Spanish	11	5	0	0	0	0
English, com. brands	11	10	0	0	0	0
SPELTER—						
Silesian, special ....ton	14	5	0	14	10	0
Ordinary brands	14	0	0	14	5	0
TIN—						
Straits	90	15	0	91	5	0
Australian	91	2	6	91	12	6
English ingots....	94	0	0	0	0	0

METALS (*continued*).	£.	s.	d.	£.	s.	d.
TINPLATES—						
IC coke ....box	0	15	6	0	17	0
IX ditto	1	1	6	1	5	0
IC charcoal	0	17	6	1	0	0
IX ditto	1	4	0	1	6	0
OILS.						
Linseed ....ton	22	7	6	22	10	0
Cocoanut, Cochin	30	10	0	31	0	0
Ceylon	26	10	0	0	0	0
Copra....	26	10	0	0	0	0
Palm, Lagos	29	0	0	0	0	0
Palm-nut Kernel	26	0	0	0	0	0
Rapeseed, English pale....	24	12	6	0	0	0
,, brown	22	12	6	22	15	0
Cottonseed, refined	20	0	0	21	10	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	7	0	0	10	0	0
,, Refined	4	0	0	15	0	0
TURPENTINE—						
American, in cks. ....cwt.	1	7	0	1	7	3
TAR—Stockholm ....brl.	0	19	6	1	0	0
Archangel....	0	11	6	0	12	0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Law Courts	Birmingham Corportn.	Not stated	Not stated	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Dispensary, Woodbridge	Govns. Seckford Hospitl, &c., Schools	*Official*	Nov. 14th	ii.
Guernsey Granite	Croydon Union....	do.	Nov. 16th	ii.
Kerbing, Tar-Paving, and Channelling	Lewisham Brd. of Wks.	do.	Nov. 17th	ii.
Aqueduct, Thirlmere	Manchester Corporatn	G. H. Hill....	do.	ii.
Re-making Roads (with New Gullies, &c.) ..	Epping R. S. A.	Edmond Egan	Nov. 20th	xviii.
Curbing, Roadmaking, Cesspools, &c.	Kent & Essx Lnd C. Lm.	G. R. Cobham	Nov. 21st	ii.
Sluice-Cocks Air-Valves, &c.	Northwich Local Board	H. Bancroft	do.	ii.
Altering and Adding to existing Copper Plates	Liverpool Corporation	*Official*	do.	ii.
Wrought-Iron Girders, &c.	do.	do.	do.	ii.
Fire Brigade Station....	Met. Board of Works	do.	Nov 23rd.	ii.
Making-up Roads	Wandsworth Bd. of Wks	do.	Nov. 24th	ii.
Erection of Bakehouse and Mortuary....	Epsom Union	H. D. Appleton	Nov. 25th	ii.
Drainage and Sanitary Works, Ashford....	Mangrs. W. L Sch. Dist.	Keith D. Young	Nov. 27th	ii.
Broken Guernsey Granite	Finchley Local Board...	G. W. Brumell....	Nov. 28th	xviii.
Pipe Sewers, &c.	Romford U. R. S. A. ...	Brundell, Simmons, & Co	Nov. 30th	ii.
Surface Drains, &c.	Tottenham Local Board	— De Pape	Dec. 1st	ii.
Iron Pier, Lee-on-the-Solent	....	E. A. Robinson....	Dec. 5th	ii.
Erection of Farm Buildings	Glamorgnshre Lun. Asy.	J. Giles & Gough	Dec. 8th	ii.
Pipe-Sewer, &c., Penge	....	W. A. Murphy....	Not stated	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Engineer	Dawlish Local Board ...	Not stated	Not stated ...	xvi.

TENDERS.

BERMONDSEY.—For rebuilding Glue and Size Works, Spa-road, Bermondsey, for Messrs. B. Young & Co. Messrs. Wheeler & Hollands, architects. Quantities by Messrs. Evans & Deacon:—

Atherton & Latta	£6,950	0	0
Kennard	6,875	0	0
H. & D. Leed	6,685	0	0
Hill Bros.	6,677	0	0
Castle	6,670	0	0
Colls & Sons	6,580	0	0
Wells	6,450	0	0
Smith & Son	6,446	0	0
Deacon & Son	6,375	0	0
Jerrard	6,298	0	0
Jervis Smith	6,249	0	0
J. & J. Greenwood	6,224	0	0
Chafen	6,148	0	0
Killby & Gayford....	6,064	0	0
Martin Wells & Co....	5,823	0	0

BETHNAL GREEN.—For building new mission hall, Gibraltar-walk, Bethnal Green:—

Gaisford	£488	14	0
Poole & Co.	485	0	0
Howard	439	0	0
Thomerson & Son....	435	0	0
Jarvis & Sons	412	0	0
Keppler	399	0	0

BRENTFORD.—For making-up Albany-road and Bangor-road, for the Brentford Local Board. Mr. F. W. Lacey, A.-M.I.C.E., surveyor:—

Albany-road.

Nowell & Robson, Kensington....	£292	0	0
S. Atkins, Twickenham....	280	0	0
H. R. Trehearne & Co., Battersea....	252	0	0
J. Mowlem & Co., Westminster....	251	0	0
T. Brunsden & Co., Brentford....	229	0	0
H. Spicer, Brentford (accepted)....	215	0	0

Bangor-road.

Nowell & Robson, Kensington....	£233	10	0
H. R. Trehearne & Co., Battersea	220	0	0
T. Brunsden & Co., Brentford....	218	0	0
H. Spicer, Brentford	203	0	0
J. Mowlem & Co., Westminster....	197	0	0
S. Atkins, Twickenham (accepted) ...	190	0	0

BRENTFORD.—For the erection of filter-presses and other machinery in connexion therewith, for the Brentford Local Board. Mr. F. W. Lacey, A.-M.I.C.E., engineer:—

Manlove, Alliott, Fryer, & Co., Nottingham (accepted)	£1,320	0	0
S. H. Johnson & Co., Stratford	1,200	0	0

CARSHALTON (Surrey).—For the erection of house, New-road, for Mr. James Gibbs. Mr. Herbert D. Appleton, architect, Wool Exchange, E.C. Quantities by Messrs. Franklin & Andrews, Ludgate-hill, E.C.:—

H. Clark	£4,522	0	0
S. Elliott....	4,483	0	0
J. Longley	4,295	0	0
B. E. Nightingale....	4,222	0	0
C. Jarrett	4,135	0	0
Prestige & Co.	3,982	0	0
Howe & White	3,953	0	0
D. Stewart....	3,866	0	0
W. Robinson	3,750	0	0
E. J. Burnand	3,508	0	0

CLAPHAM.—For the erection of the Clapham School of Art, Clapham. Messrs. I'Anson & Son, architects. Quantities by Messrs. D. Campbell & Son:—

McLachlan & Son	£2,368	0	0
Higgs & Hill	2,160	0	0
Ryder & Son	2,048	0	0
Kynoch & Co.	2,025	0	0

CLERKENWELL.—For new houses, stables, coach-house, &c., and repairs, alterations, and additions to premises on plot of land at the corner of Penton-street and Chapel-street, Clerkenwell, for Mr. D. Cooksey. Mr. J. Douglass Mathews, architect, Dowgate-hill. Quantities supplied:—

Goodman....	£3,985	0	0
Stiles	3,931	0	0
Dove Bros....	3,475	0	0
Hearle & Son....	3,285	0	0
Williams & Son....	3,270	0	0
Grover & Son....	3,188	0	0
Spencer & Co.	3,175	0	0
Thos. Wontner Smith & Son....	3,172	0	0
Killby & Gayford....	2,976	0	0

HORNSEY.—For making-up the carriageway of Cecile Park-road West, for the Hornsey Local Board. Mr. T. De Courcy Meade, engineer and surveyor:—

J. Jackson, Enfield....	£720	0	0
Hearn, Hoxton....	657	0	0
Dunmore, Crouch End	625	0	0
Bell, Tottenham	567	0	0
Pizzey, Hornsey	544	0	0
Nicholls, Wood Green	543	0	0
D. A. Jackson & Son, Dimsbury Park	516	0	0
W. T. Williamson, Green Lanes.... ...	499	0	0
Mowlem & Co., Westminster	488	0	0
Walker, Upper Holloway....	467	19	6
A. W. Rowles, Acton (accepted)	410	0	0

LONDON.—For building the superstructure, from the ground-floor level upwards, of block of buildings at the corner of Great College-street and Kentish Town-road, for Mr. M. MacSheehan. Mr. Frank J. Chambers, architect. Quantities by Mr. Mark W. King:—

Dove Bros....	£8,945	0	0
Kerry & Son	8,429	0	0
Ashby & Horner	8,140	0	0
Brass & Son	7,974	0	0
J. & J. Greenwood	7,956	0	0
Holland & Hannen	7,888	0	0
E. Conder	7,550	0	0
Mattock Bros.	7,273	0	0
Nightingale	7,268	0	0
Bayliss....	6,948	0	0
Grover & Son....	6,794	0	0
Killby & Gayford....	6,736	0	0

LONDON.—For rebuilding the Duke of Argyll public-house. Mr. J. T. Wimperis, architect:—

Paramor & Sons	£5,140	0	0
Balaam Bros....	4,850	0	0
Stanley G. Bird	4,690	0	0
Hermon & Sons....	4,679	0	0
Scrivener & Co....	4,677	0	0
Hatfield	4,640	0	0
Bywaters....	4,548	0	0
H. & E. Lee	4,523	0	0
Prestige & Co.	4,459	0	0
Barker....	4,449	0	0
Bush....	4,273	0	0
Grover & Son....	4,193	0	0

LONDON.—For erecting and completing new stables in the rear of No. 16, Fulham-road, S.W., for the London Road Car Company, Limited. Mr. Peter Dollar, architect, Great Marlborough-street, W.:—

				Time.
Langdale & Co....	£3,986	0	0 ...	—
Foster & Dicksee....	3,497	0	0 ...	4 months.
Stevens & Co.	3,420	0	0 ...	3 ,,
Scrivener & Co.	3,323	0	0 ...	4 ,,
Prestige & Co.	3,184	0	0 ...	2 ,,
Gibbs & Flew	2,950	0	0 ...	3 ,,
Mark Manley	2,925	0	0 ...	3 ,,
Lorden & Son	2,739	0	0 ...	4 ,,

LONDON.—For alterations, &c., at Ivy House, Edgware-road, for the United Christian Mission Society:—

Cowell....	£198	0	0
Harris....	157	0	0
Smith	129	0	0
Brighton....	116	0	0
Eagle & Co. (accepted)	110	0	0

LONDON.—For alterations and repairs to stables and workshops in rear of Union-street, Oxford-street, for Mr. P. Ness. Mr. R. J. H. Stoneham, architect. Quantities by Mr. C. Cadney:—

F. & F. Wood	£573	0	0
B. Colley	543	0	0
J. Morter	530	0	0
Steel Bros....	497	0	0
Jackson & Todd	489	0	0
Shurmur....	486	0	0
W. Johnson (accepted)....	485	0	0
Wall Bros. (too late)	484	0	0

LONDON.—For the completion of premises, Nos. 13 and 15, Gray's Inn-road, for Mr. A. J. Gollington. Mr. Richard W. Crawley, architect:—

J. O. Richardson, Peckham....	£735	0	0

LONDON.—For mortuary buildings for the St. Pancras Vestry. Quantities not supplied. Mr. F. Eggar, architect, Gower-street:—

	Contract No. 1.			Contract No. 2.		
Harbrow & Co.	£985	0	0 ...	£2,670	0	0
Linfield....	9?3	0	0 ...	2,277	0	0
Plummer	815	10	0 ...	2,283	0	0
Nicholls....	632	0	0 ...	1,755	0	0
Leslie & Knight	415	0	0 ...	1,531	0	0
A. & C. Braid	363	0	0 ...	1,679	0	0
Ridout	365	10	0 ...	1,345	0	0

LONGRIDGE.—For works in connexion with the erection of Longridge Church. Mr. Ewan Christian, architect. Quantities by Messrs. Vinall & Kennedy, Guilford-street, Russell-square, W.C.:—

Excavator, Drains, Waller, and Mason.

W. H. Harrison, Preston	3,100	0	0

Slater.

H. Wilkinson, Preston	126	10	0

Carpenter, Joiner, and Ironmonger.

T. Hacking, Clayton-le-Moors	933	0	0

Smith, Plumber, Glazier, and Painter.

R. Crossdale, Preston	550	0	0

Plasterer.

R. Arrowsmith, Preston....	47	0	0

PECKHAM.—For the erection of residential chambers in South-grove, Peckham, for Mr. John Baker. Mr. G. Percival, architect. Quantities supplied:—

Manley	£998	0	0
Stevens	990	0	0
Smith	880	0	0
J. O. Richardson (accepted)	870	0	0
Allen	818	0	0

PLAISTOW.—For making sundry alterations at the Lord Gough, Plaistow, for Mr. Dean:—

W. Buckle, Stratford (accepted)	£475	0	0

PIMLICO.—For erection of public mortuary at Ebury Bridge, Pimlico, S.W., for the Vestry of St. George, Hanover-square. Quantities supplied by the surveyor, Mr. G. Livingstone, C.E.:—

J. Botterill	£1,095	0	0 !
Lyne & Smith	1,004	1	11
W. H. Richardson	999	6	3
T. Richards	945	0	0
Linfield	877	0	0
Harbrow & Co.	843	0	0
B. Walker	829	0	0
Warr	825	0	0
J. R. Hunt	820	0	0
H. B. Little	800	0	0
J. Webb	799	0	0
J. Bullers	795	0	0
J. Newton	760	0	0
G. Howard	757	5	0
A. Thompson	750	0	0
Belham	749	0	0
G. T. Williams	747	0	0
Wilkins & Kent	745	0	0
T. Coulthard	725	0	0
Griffiths & Co.	690	0	0
Leslie & Knight	687	0	0
Kirk Bros.	685	0	0
G. Roberts	684	0	0
A. & C. Braid (accepted)	683	0	0
J. Ridout	630	0	0
C. H. J. Pawley	499	0	0 !

RICHMOND (Surrey).—For surface-water drainage-works. Mr. Walter Brooke, A.-M.I.C.E., town surveyor:—

	A.			B.		
T. Rigby, Croydon	£5,713	0	0	£3,969	0	0
W. Langridge, Croydon	5,449	0	0	3,950	0	0
Nowell & Robson, Kensington	5,465	0	0	3,675	0	0
J. Harrison, Brighton	5,350	0	0	3,650	0	0
W. Harris, Camberwell	5,040	0	0	3,205	0	0
A. J. Catley, Lloyd-square	4,878	0	0	3,200	0	0
W. G. Botterill, Cannon-st.	4,384	0	0	3,113	0	0
L. Bottom, Battersea	4,275	0	0	2,774	0	0
E. & W. Isles, Wimbledon	4,167	0	0	2,779	0	0
B. Cooke & Co., Battersea	4,141	0	0	2,762	0	0
F. Sims, Richmond	4,042	0	0	2,826	0	0
G. Neale, Wandsworth	4,081	0	0	2,669	0	0
F. B. Hayter, Landport	4,080	0	0	2,598	0	0
J. S. Halliwell, Ealing	3,959	18	0	2,516	7	0
G. Cowdery & Sons, Newent	3,921	11	2	2,490	5	6
J. G. B. Marshall, Brighton	3,700	0	0	2,500	0	0
R. Mayo, Brixton	3,603	0	0	2,459	0	0
J. W. & J. Neave, Leytonstone	3,580	0	0	2,459	0	0
Peill & Sons, Bromley, Kent	3,653	0	0	2,353	0	0
G. Bell, Tottenham	3,592*	0	0	2,396*	0	0

W. Cordon, Nottingham (too late).

[Engineer's estimate £4,441 7 2 and £3,063 18 10.]
A. Contract No. 1, Black Horse-lane outfall.
B. Contract No. 2, Friar's-lane outfall.
* Accepted.

SOUTHWARK.—For erecting a warehouse in Blackman-street, Borough, S.E. Mr. G. B. Williams, architect:—

	Net.		
Conder	£2,195	0	0
Dove	2,195	0	0
Little	2,146	0	0
Rider	2,128	0	0
Ashby & Horner	2,096	0	0
Higgs & Hill	2,094	0	9
Canning & Co.	2,047	0	0
Prestige & Co.	1,989	0	0
Hart	1,974	0	0
Greenwood	1,955	0	0

STAINES.—For villa-residence at Staines, for Mr. Wm. Burge. Mr. C. Welch, architect. Quantities not supplied:—

Oades & Son	£695	0	0
Harbrow & Co.	683	0	0
Reavell	659	0	0
Belch	599	0	0
B. Walker	591	0	0

WANDSWORTH.—For three dwelling-houses in flats, on site of Nos. 124 and 126, Wandsworth-road, S.W., for Mr. E. B. Graburn. Mr. J. William Stevens, architect, New Bridge-street. Quantities supplied:—

Green, Red Lion-street	£2,675	0	0
Lavender & Son, Clapham	2,350	0	0
White & Co., Rotherhithe	2,331	0	0
Smith & Son, Norwood	2,194	0	0
Prestige & Co., Pimlico	2,192	0	0
Blyton, Thames-street	2,100	0	0
Creed, Brixton	2,099	0	0
Pack, Brixton	1,926	0	0
Richardson, Peckham	1,888	0	0

WALTHAMSTOW.—For corner shop, stable, and house, at Walthamstow, for Mr. Geo. Brown. Mr. J. H. Bethell, architect:—

G. Hall	£1,082	0	0
Holland & Co.	1,042	10	0
T. Baxter	930	0	0
R. D. Boyd	888	0	0
J. W. Wyles (accepted)	646	5	0

[Architect's estimate, 620*l.*]

WESTMINSTER.—For rebuilding Messrs. T. & W. Farmiloe's warehouse, Rochester-row. Messrs. Isaacs & Florence, architects. Quantities by Mr. L. C. Riddett:—

Perry & Co.	£5,665 0 0
Mowlem & Co.	5,638 0 0
Greenwood	5,621 0 0
Martin Wells & Co.	5,576 0 0
Patman & Fotheringham	5,563 0 0
Braid	5,500 0 0
Green	5,467 0 0
Wall Bros.	5,421 0 0
Prestige & Co. (accepted)	5,373 0 0

***SPECIAL NOTICE.*—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.**

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

C. W.—W. H.—C. L.—W. H. P.—A. N.—H. M. M.—S. W.—R. B.—G. P. & Sons.—R. S. & Co.—G. G.—G. B. N. & Sons.—W. & J.—G. F. S.—E. P. (the treatment is certainly illiberal, but if the competitors were distinctly instructed to conform to the local building laws, and did not do so, they have no technical ground of complaint) —W. H. C. (we decline to advise on purely legal questions connected with building operations)—S. C.—P. G. S. (shall have attention)—"Twelve Years' Subscriber" (cannot advise; consult a chemist).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

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DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS in STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have *Replies addressed to the Office*, 46, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum PREPAID. To all parts of Europe and America, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINIER, Publisher, No. 46, Catherine-street, W.C.

Best Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down,
And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [ADVT.

Dry Corsham Stone.
150,000 feet cube,
for winter use.
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